

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
Engineering Mathematics – I (BTCE0103)/(BTCSE0103)/
(BTETE0103)/ (BTEE0103)/ (BTME0103)

Day & Date: Monday, 13-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) If $y = \log(3x + 2)$ then $y_n =$ _____.
 - a) $\frac{(-1)^n n! 3^n}{(3x + 2)^n}$
 - b) $\frac{(-1)^{n-1} (n-1)! 3^n}{(3x + 2)^n}$
 - c) $\frac{(-1)^{n-1} (n-1)! 3^n}{(3x + 2)^{n+1}}$
 - d) none of these
- 2) The value of $\lim_{x \rightarrow 0} \left(\frac{1 - \cos x}{x^2} \right) =$ _____.
 - a) $\frac{1}{2}$
 - b) -2
 - c) $\frac{-1}{2}$
 - d) 2
- 3) Expansion of $4x^2 + 5x + 12$ in powers of $(x - 1)$ is _____.
 - a) $21 + 13(x - 1) + 4(x - 1)^2$
 - b) $21 - 3(x - 1) + 8(x - 1)^2$
 - c) $21 + 13(x - 1) + 8(x - 1)^2$
 - d) None of these
- 4) If $y = \cos^2 x$, then $y_n =$ _____.
 - a) $2^n \cos \left(2x + n \frac{\pi}{2} \right)$
 - b) $2^{n-1} \cos \left(2x + n \frac{\pi}{2} \right)$
 - c) $2^{n-1} \sin \left(2x + n \frac{\pi}{2} \right)$
 - d) None of these
- 5) The expansion of $\log(1 - x) =$ _____.
 - a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$
 - b) $x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - \dots$
 - c) $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \dots$
 - d) $-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$
- 6) The eigen values of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$ are _____.
 - a) $0, 2, 5$
 - b) $1, 2, 5$
 - c) $1, -2, -5$
 - d) $-1, -2, -5$

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Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

Q.2 Solve any three of the following questions.

09

- a) Reduce the following matrix into normal form and find their rank

$$\begin{bmatrix} 6 & 4 & 7 & 3 \\ 4 & 3 & 4 & 2 \\ 2 & 1 & 5 & 6 \end{bmatrix}$$

- b) Examine for linear independence or dependence the following set of vectors $(3 \ 2 \ 4), (1 \ 0 \ 2), (1 \ -1 \ -1)$
 c) Expand $2x^3 + 3x^2 - 8x + 7$ in terms of $(x - 2)$.
 d) Evaluate $\lim_{x \rightarrow 0} \frac{x^2 + 2 \cos x - 2}{x \sin^3 x}$
 e) Find the n-th derivative of $y = \frac{1}{(x-1)(x-2)(x-3)}$

Q.3 Solve any three of the following questions.

09

- a) Solve: $3x - y - z = 0$, $x + y + 2z = 0$, $5x + y + 3z = 0$
 b) Verify Cayley Hamilton theorem for the matrix A

$$A = \begin{bmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$$

- c) Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\tan x}$
 d) Expand $\tan^{-1} x$ in ascending powers of x by using differentiation and integration method.
 e) Find the n-th derivative of $y = \sin x \sin 2x \sin 3x$

Q.4 Solve any two of the following questions.

10

- a) Find Eigen values & the Eigen vectors corresponding to Eigen values of the of matrix

$$\begin{bmatrix} 7 & -2 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{bmatrix}$$

- b) If $y = \sin(m \sin^{-1} x)$ prove that
 $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} + (m^2 - n^2)y_n = 0$
 c) Prove that $\log(1 + \sin x) = x - \frac{x^2}{2} + \frac{x^3}{6} - \dots$

Section – II

Q.5 Attempt any three of the following.**09**

- a) If $u = 2(ax + by)^2 - (x^2 + y^2)$ where $a^2 + b^2 = 4$, then find $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$
- b) Show that $JJ' = 1$, if $u = x^2, v = y^2$
- c) If $u = ax + by, v = bx - ay$, then prove that $\left(\frac{\partial u}{\partial x}\right)_y \cdot \left(\frac{\partial x}{\partial u}\right)_v \cdot \left(\frac{\partial y}{\partial v}\right)_x \cdot \left(\frac{\partial v}{\partial y}\right)_u = 1$
- d) A particle moves along the curve $x = 2 \sin 3t, y = 2 \cos 3t, z = 8t$, then calculate the velocity and acceleration vectors and their magnitudes.
- e) The sum of three positive numbers is 1. Determine the maximum value of their product.

Q.6 Attempt any three of the following.**09**

- a) If $z = \sin^{-1}(x - y)$ and $x = 3t, y = 4t^3$ then show that $\frac{dz}{dt} = \frac{3}{\sqrt{1-t^2}}$
- b) Calculate the percentage error in s where $s = kp^{1/2}v^2$, if percentage errors in p & v are respectively 2 & 1.5
- c) Determine the directional derivative of $\phi = x^2y + y^2z + z^2x^2$ at the point $(1, 2, 1)$ in the direction of vector $\vec{a} = i + 2j - 2k$.
- d) If $u = f(x - y, y - z, z - x)$, then show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$
- e) Prove that $\nabla(r^n) = nr^{n-2}\vec{r}$

Q.7 Attempt any two of the following.**10**

- a) If $u = \sin^{-1}\left(\frac{x^{1/4} + y^{1/4}}{x^{1/6} + y^{1/6}}\right)$ then prove that
- $$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{144} (\tan^2 u - 11).$$
- b) Find the maximum and minimum values of $f(x, y) = x^3 + y^3 - 3axy$
- c) Show that a vector field \vec{f} is given by $\vec{f} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational and hence find its scalar potential such that $\vec{f} = \nabla\phi$

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Marks:14

14

- Page 5 of 16

- 8) If $y = \log(3x + 2)$ then $y_n =$ _____.
 a) $\frac{(-1)^n n! 3^n}{(3x + 2)^n}$ b) $\frac{(-1)^{n-1} (n-1)! 3^n}{(3x + 2)^n}$
 c) $\frac{(-1)^{n-1} (n-1)! 3^n}{(3x + 2)^{n+1}}$ d) none of these
- 9) The value of $\lim_{x \rightarrow 0} \left(\frac{1 - \cos x}{x^2} \right) =$ _____.
 a) $\frac{1}{2}$ b) -2
 c) $\frac{-1}{2}$ d) 2
- 10) Expansion of $4x^2 + 5x + 12$ in powers of $(x - 1)$ is _____.
 a) $21 + 13(x - 1) + 4(x - 1)^2$ b) $21 - 3(x - 1) + 8(x - 1)^2$
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- 11) If $y = \cos^2 x$, then $y_n =$ _____.
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 c) $2^{n-1} \sin \left(2x + n \frac{\pi}{2} \right)$ d) None of these
- 12) The expansion of $\log(1 - x) =$ _____.
 a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ b) $x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - \dots$
 c) $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \dots$ d) $-x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \dots$
- 13) The eigen values of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$ are _____.
 a) $0, 2, 5$ b) $1, 2, 5$
 c) $1, -2, -5$ d) $-1, -2, -5$
- 14) The rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ -1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ is _____.
 a) 0 b) 1
 c) 2 d) 3

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Section – I

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- c) Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\tan x}$
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Q.4 Solve any two of the following questions.

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- a) Find Eigen values & the Eigen vectors corresponding to Eigen values of the of matrix

$$\begin{bmatrix} 7 & -2 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{bmatrix}$$

- b) If $y = \sin(m \sin^{-1} x)$ prove that
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Section – II

Q.5 Attempt any three of the following.**09**

- a) If $u = 2(ax + by)^2 - (x^2 + y^2)$ where $a^2 + b^2 = 4$, then find $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$
- b) Show that $JJ' = 1$, if $u = x^2, v = y^2$
- c) If $u = ax + by, v = bx - ay$, then prove that $\left(\frac{\partial u}{\partial x}\right)_y \cdot \left(\frac{\partial x}{\partial u}\right)_v \cdot \left(\frac{\partial y}{\partial v}\right)_x \cdot \left(\frac{\partial v}{\partial y}\right)_u = 1$
- d) A particle moves along the curve $x = 2 \sin 3t, y = 2 \cos 3t, z = 8t$, then calculate the velocity and acceleration vectors and their magnitudes.
- e) The sum of three positive numbers is 1. Determine the maximum value of their product.

Q.6 Attempt any three of the following.**09**

- a) If $z = \sin^{-1}(x - y)$ and $x = 3t, y = 4t^3$ then show that $\frac{dz}{dt} = \frac{3}{\sqrt{1-t^2}}$
- b) Calculate the percentage error in s where $s = kp^{1/2}v^2$, if percentage errors in p & v are respectively 2 & 1.5
- c) Determine the directional derivative of $\phi = x^2y + y^2z + z^2x^2$ at the point $(1, 2, 1)$ in the direction of vector $\vec{a} = i + 2j - 2k$.
- d) If $u = f(x - y, y - z, z - x)$, then show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$
- e) Prove that $\nabla(r^n) = nr^{n-2}\vec{r}$

Q.7 Attempt any two of the following.**10**

- a) If $u = \sin^{-1}\left(\frac{x^{1/4} + y^{1/4}}{x^{1/6} + y^{1/6}}\right)$ then prove that
- $$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{144} (\tan^2 u - 11).$$
- b) Find the maximum and minimum values of $f(x, y) = x^3 + y^3 - 3axy$
- c) Show that a vector field \vec{f} is given by $\vec{f} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational and hence find its scalar potential such that $\vec{f} = \nabla\phi$

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) If $z = x^y$ then $\frac{\partial z}{\partial y} =$ _____.
 - a) yx^{y-1}
 - b) xy^{x-1}
 - c) $y^x \log x$
 - d) $x^y \log x$
- 2) With usual notation $f(x, y)$ has a saddle point if _____.
 - a) $rt - s^2 < 0$
 - b) $rt - s^2 > 0$
 - c) $rt - s^2 \neq 0$
 - d) $rt - s^2 = 0$
- 3) If $\vec{F} = (x + 3y)\vec{i} + (y - 2z)\vec{j} + (x + az)\vec{k}$ is solenoidal then $a =$ _____.
 - a) 2
 - b) -2
 - c) 1
 - d) 0
- 4) If δx is error in x , then $\frac{\delta x}{x}$ is called _____.
 - a) Absolute error in x
 - b) Percentage error in x
 - c) Relative error in x
 - d) Approximate error in x
- 5) If $y = \log(3x + 2)$ then $y_n =$ _____.
 - a) $\frac{(-1)^n n! 3^n}{(3x + 2)^n}$
 - b) $\frac{(-1)^{n-1} (n-1)! 3^n}{(3x + 2)^n}$
 - c) $\frac{(-1)^{n-1} (n-1)! 3^n}{(3x + 2)^{n+1}}$
 - d) none of these
- 6) The value of $\lim_{x \rightarrow 0} \left(\frac{1 - \cos x}{x^2} \right) =$ _____.
 - a) $\frac{1}{2}$
 - b) -2
 - c) $-\frac{1}{2}$
 - d) 2
- 7) Expansion of $4x^2 + 5x + 12$ in powers of $(x - 1)$ is _____.
 - a) $21 + 13(x - 1) + 4(x - 1)^2$
 - b) $21 - 3(x - 1) + 8(x - 1)^2$
 - c) $21 + 13(x - 1) + 8(x - 1)^2$
 - d) None of these

- 8) If $y = \cos^2 x$, then $y_n =$ _____.
 a) $2^n \cos\left(2x + n\frac{\pi}{2}\right)$ b) $2^{n-1} \cos\left(2x + n\frac{\pi}{2}\right)$
 c) $2^{n-1} \sin\left(2x + n\frac{\pi}{2}\right)$ d) None of these
- 9) The expansion of $\log(1 - x) =$ _____.
 a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ b) $x - \frac{x^2}{2!} - \frac{x^3}{3!} - \frac{x^4}{4!} - \dots$
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- 10) The eigen values of the matrix $\begin{bmatrix} 1 & 3 & -1 \\ 0 & 2 & 4 \\ 0 & 0 & 5 \end{bmatrix}$ are _____.
 a) 0, 2, 5 b) 1, 2, 5
 c) 1, -2, -5 d) -1, -2, -5
- 11) The rank of the matrix $A = \begin{bmatrix} 1 & 1 & 1 \\ -1 & 0 & 1 \\ 1 & 1 & 1 \end{bmatrix}$ is _____.
 a) 0 b) 1
 c) 2 d) 3
- 12) If $u = \sin^{-1}\left(\frac{x}{y} + \frac{y}{z} + \frac{z}{x}\right)$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z} =$ _____.
 a) u b) $-u$
 c) 0 d) 1
- 13) For a vector function \vec{F} is called solenoidal if _____.
 a) $\text{curl } \vec{F} = 0$ b) $\text{div } \vec{F} = 0$
 c) $\text{grad } \vec{F} = 0$ d) $\text{div } \vec{F} \neq 0$
- 14) If $u = x - y$, and $v = xy$, then $\frac{\partial(u,v)}{\partial(x,y)} = ?$
 a) $x + y$ b) 0
 c) $y - x$ d) None of these

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Set **R**

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Section – I

Q.2 Solve any three of the following questions.

09

- a) Reduce the following matrix into normal form and find their rank

$$\begin{bmatrix} 6 & 4 & 7 & 3 \\ 4 & 3 & 4 & 2 \\ 2 & 1 & 5 & 6 \end{bmatrix}$$

- b) Examine for linear independence or dependence the following set of vectors $(3 \ 2 \ 4), (1 \ 0 \ 2), (1 \ -1 \ -1)$
 c) Expand $2x^3 + 3x^2 - 8x + 7$ in terms of $(x - 2)$.
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09

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Q.4 Solve any two of the following questions.

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Section – II

Q.5 Attempt any three of the following.**09**

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Q.7 Attempt any two of the following.**10**

- a) If $u = \sin^{-1}\left(\frac{x^{1/4} + y^{1/4}}{x^{1/6} + y^{1/6}}\right)$ then prove that
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- b) Find the maximum and minimum values of $f(x, y) = x^3 + y^3 - 3axy$
- c) Show that a vector field \vec{f} is given by $\vec{f} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational and hence find its scalar potential such that $\vec{f} = \nabla\phi$

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Section – I

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- a) Reduce the following matrix into normal form and find their rank

$$\begin{bmatrix} 6 & 4 & 7 & 3 \\ 4 & 3 & 4 & 2 \\ 2 & 1 & 5 & 6 \end{bmatrix}$$

- b) Examine for linear independence or dependence the following set of vectors $(3 \ 2 \ 4), (1 \ 0 \ 2), (1 \ -1 \ -1)$
 c) Expand $2x^3 + 3x^2 - 8x + 7$ in terms of $(x - 2)$.
 d) Evaluate $\lim_{x \rightarrow 0} \frac{x^2 + 2 \cos x - 2}{x \sin^3 x}$
 e) Find the n-th derivative of $y = \frac{1}{(x-1)(x-2)(x-3)}$

Q.3 Solve any three of the following questions.

09

- a) Solve: $3x - y - z = 0$, $x + y + 2z = 0$, $5x + y + 3z = 0$
 b) Verify Cayley Hamilton theorem for the matrix A

$$A = \begin{bmatrix} 1 & 3 & 7 \\ 4 & 2 & 3 \\ 1 & 2 & 1 \end{bmatrix}$$

- c) Evaluate $\lim_{x \rightarrow \frac{\pi}{2}} (\sin x)^{\tan x}$
 d) Expand $\tan^{-1} x$ in ascending powers of x by using differentiation and integration method.
 e) Find the n-th derivative of $y = \sin x \sin 2x \sin 3x$

Q.4 Solve any two of the following questions.

10

- a) Find Eigen values & the Eigen vectors corresponding to Eigen values of the of matrix

$$\begin{bmatrix} 7 & -2 & 0 \\ -2 & 6 & -2 \\ 0 & -2 & 5 \end{bmatrix}$$

- b) If $y = \sin(m \sin^{-1} x)$ prove that
 $(1 - x^2)y_{n+2} - (2n + 1)xy_{n+1} + (m^2 - n^2)y_n = 0$
 c) Prove that $\log(1 + \sin x) = x - \frac{x^2}{2} + \frac{x^3}{6} - \dots$

Section – II

Q.5 Attempt any three of the following.

09

- a) If $u = 2(ax + by)^2 - (x^2 + y^2)$ where $a^2 + b^2 = 4$, then find $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2}$
- b) Show that $JJ' = 1$, if $u = x^2, v = y^2$
- c) If $u = ax + by, v = bx - ay$, then prove that $\left(\frac{\partial u}{\partial x}\right)_y \cdot \left(\frac{\partial x}{\partial u}\right)_v \cdot \left(\frac{\partial y}{\partial v}\right)_x \cdot \left(\frac{\partial v}{\partial y}\right)_u = 1$
- d) A particle moves along the curve $x = 2 \sin 3t, y = 2 \cos 3t, z = 8t$, then calculate the velocity and acceleration vectors and their magnitudes.
- e) The sum of three positive numbers is 1. Determine the maximum value of their product.

Q.6 Attempt any three of the following.

09

- a) If $z = \sin^{-1}(x - y)$ and $x = 3t, y = 4t^3$ then show that $\frac{dz}{dt} = \frac{3}{\sqrt{1-t^2}}$
- b) Calculate the percentage error in s where $s = kp^{1/2}v^2$, if percentage errors in p & v are respectively 2 & 1.5
- c) Determine the directional derivative of $\phi = x^2y + y^2z + z^2x^2$ at the point $(1, 2, 1)$ in the direction of vector $\vec{a} = i + 2j - 2k$.
- d) If $u = f(x - y, y - z, z - x)$, then show that $\frac{\partial u}{\partial x} + \frac{\partial u}{\partial y} + \frac{\partial u}{\partial z} = 0$
- e) Prove that $\nabla(r^n) = nr^{n-2}\vec{r}$

Q.7 Attempt any two of the following.

10

- a) If $u = \sin^{-1}\left(\frac{x^{1/4} + y^{1/4}}{x^{1/6} + y^{1/6}}\right)$ then prove that
- $$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = \frac{\tan u}{144} (\tan^2 u - 11).$$
- b) Find the maximum and minimum values of $f(x, y) = x^3 + y^3 - 3axy$
- c) Show that a vector field \vec{f} is given by $\vec{f} = (6xy + z^3)i + (3x^2 - z)j + (3xz^2 - y)k$ is irrotational and hence find its scalar potential such that $\vec{f} = \nabla\phi$

Seat No.	
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Max. Marks: 70

Marks: 14

14

- Page 1 of 20

Seat No.	
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Set **P**

F.Y. (B Tech) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mechanics (BTCE0106) / (BTCSE0106)
/ (BTETE0106) / (BTEE0106) / (BTME0106)

Day & Date: Wednesday, 15-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

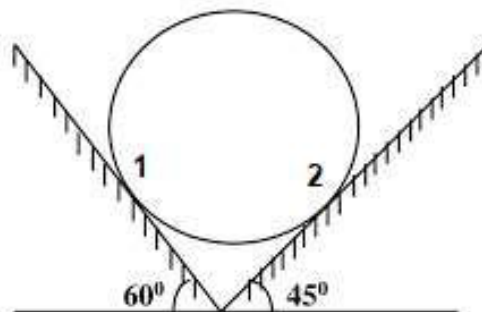
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever needed & mention it clearly.
 4) Draw neat sketches wherever necessary.

Section – I

Q.2 Attempt any four the following questions.

12

- State and derive Varignon's theorem of moment.
- Explain types of beam with neat sketches.
- Explain the term:
 - Perfect frame
 - Deficient frame
 - Redundant frame
- A 400 N sphere is resting in a trough as shown in figure. Determine reactions developed at contact surfaces. Assume all the contact surfaces are smooth.

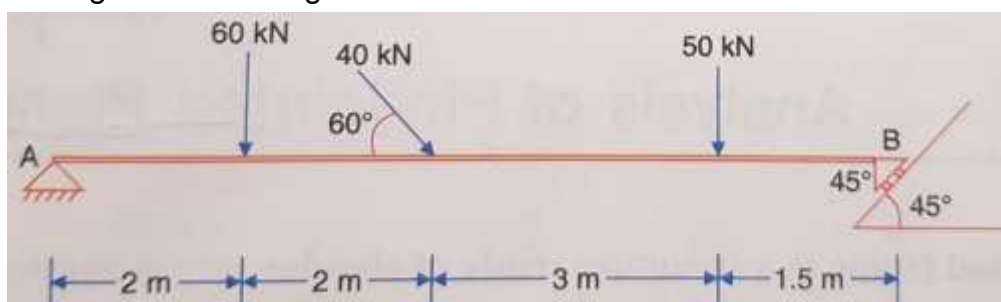


- Distinguish between angular motion and linear motion.
- Explain motion curves.

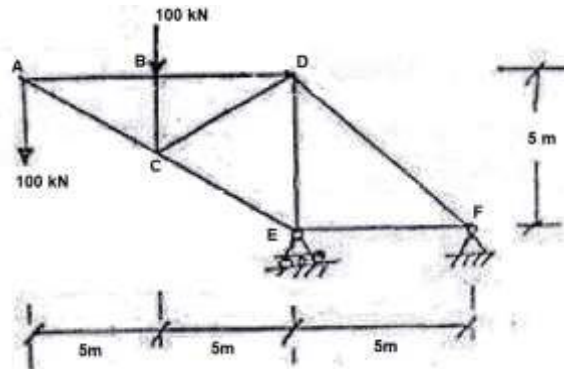
Q.3 Attempt any two the following questions.

16

- Beam AB, 8.5 m long, is hinged at A and has roller support at B. The roller support is inclined at 45° to the horizontal. Find the reactions at A and B, if loads acting are shown in figure



- b) Find the forces in all members by using method of joints.



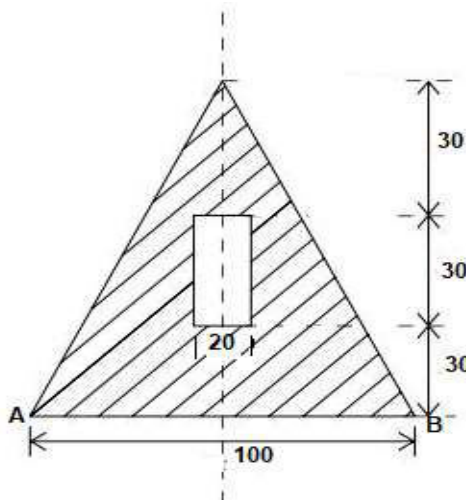
- c) The rotation of fly wheel is governed by the equation $\omega = 3t^2 - 2t + 2$. After one second from the start the angular displacement was 4 radians. Determine the angular displacement and angular velocity of the fly wheel $t = 3$ seconds.

Section – II

Q.4 Attempt any four of the following question.

12

- State and explain D' Alembert's principle of linear motion.
- What do you understand by the condition of dynamic equilibrium?
- Explain work energy principle.
- Define the terms
 - Velocity of projection
 - Angle of projection
 - Horizontal Range
- State and prove perpendicular axes theorem.
- Determine the location of centroid of the lamina shown in Fig.

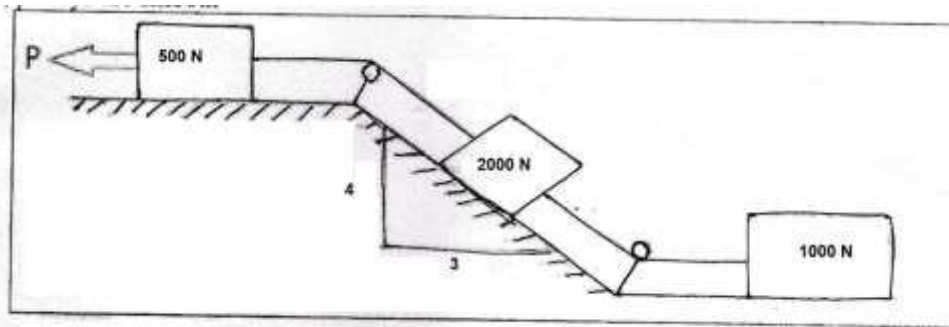


Q.5 Attempt any two of the following question.

16

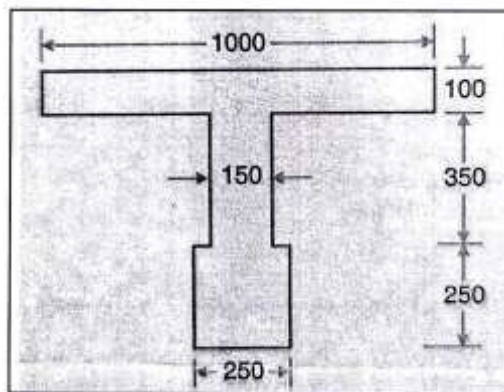
- An elevator cage of mine shaft weighing 8 kN, when empty, is lifted and lowered by means of a wire rope. Once man weighing, 600 N, entered it and lowered with uniform acceleration such that a distance of 187.5 m was covered, the velocity of the cage was 25 m/sec. Determine Tension in the rope and force exerted by the man on the floor.

- b) Determine the constant force P that will give the system of bodies as shown Figure, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3 , pulleys are smooth



Fig(v)

- c) Determine the polar moment of inertia about centroidal axes of the I-Section as shown in the figure. (All dimensions are in mm.)



F.Y. (B Tech) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mechanics (BTCE0106)/ (BTCSE0106) / (BTETE0106)/
(BTEE0106)/ (BTME0106)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data wherever needed & mention it clearly.
- 5) Draw neat sketches wherever necessary.

Marks: 14

14

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Seat No.	
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Set **Q**

F.Y. (B Tech) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mechanics (BTCE0106) / (BTCSE0106)
/ (BTETE0106) / (BTEE0106) / (BTME0106)

Day & Date: Wednesday, 15-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

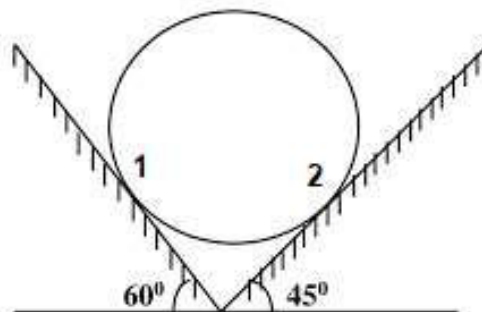
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever needed & mention it clearly.
 4) Draw neat sketches wherever necessary.

Section – I

Q.2 Attempt any four the following questions.

12

- State and derive Varignon's theorem of moment.
- Explain types of beam with neat sketches.
- Explain the term:
 - Perfect frame
 - Deficient frame
 - Redundant frame
- A 400 N sphere is resting in a trough as shown in figure. Determine reactions developed at contact surfaces. Assume all the contact surfaces are smooth.

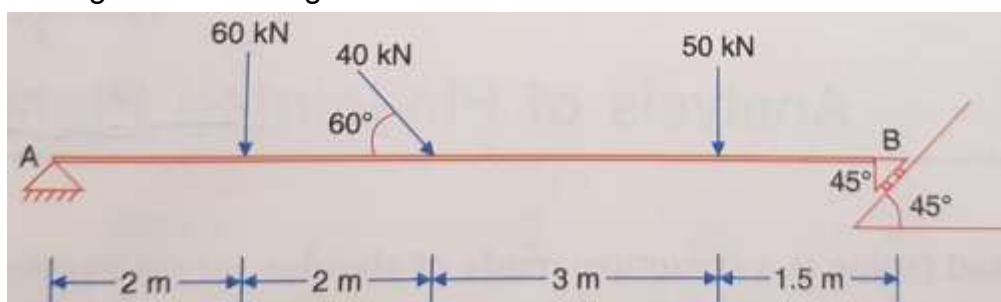


- Distinguish between angular motion and linear motion.
- Explain motion curves.

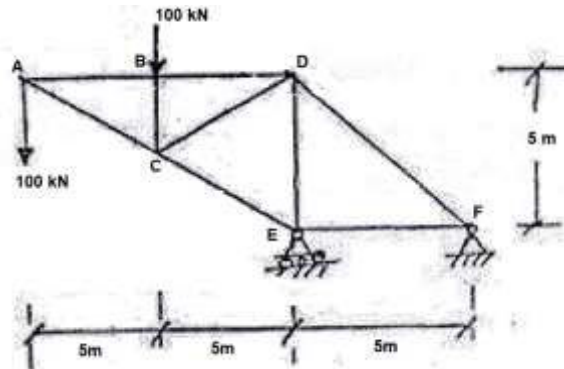
Q.3 Attempt any two the following questions.

16

- Beam AB, 8.5 m long, is hinged at A and has roller support at B. The roller support is inclined at 45° to the horizontal. Find the reactions at A and B, if loads acting are shown in figure



- b) Find the forces in all members by using method of joints.



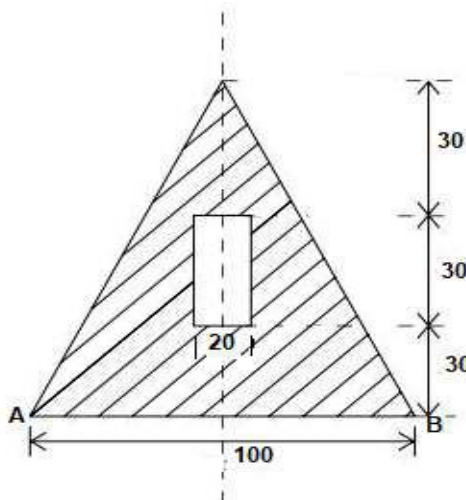
- c) The rotation of fly wheel is governed by the equation $\omega = 3t^2 - 2t + 2$. After one second from the start the angular displacement was 4 radians. Determine the angular displacement and angular velocity of the fly wheel $t = 3$ seconds.

Section – II

Q.4 Attempt any four of the following question.

12

- State and explain D' Alembert's principle of linear motion.
- What do you understand by the condition of dynamic equilibrium?
- Explain work energy principle.
- Define the terms
 - 1) Velocity of projection
 - 2) Angle of projection
 - 3) Horizontal Range
- State and prove perpendicular axes theorem.
- Determine the location of centroid of the lamina shown in Fig.

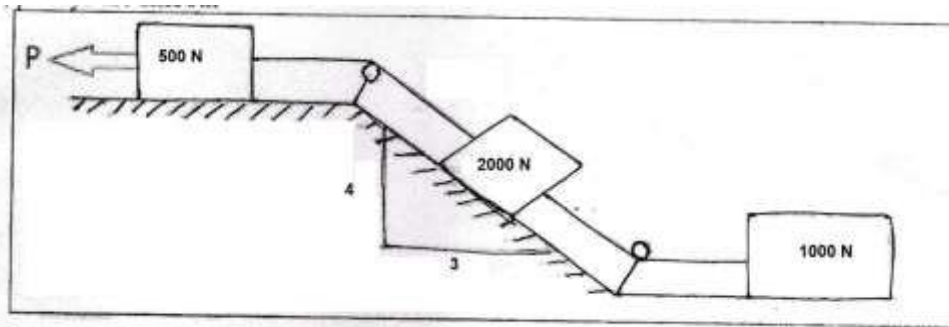


Q.5 Attempt any two of the following question.

16

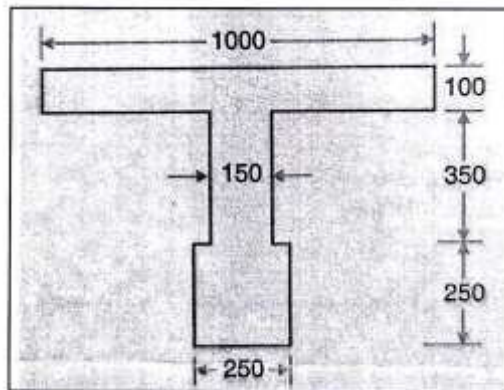
- An elevator cage of mine shaft weighing 8 kN, when empty, is lifted and lowered by means of a wire rope. Once man weighing, 600 N, entered it and lowered with uniform acceleration such that a distance of 187.5 m was covered, the velocity of the cage was 25 m/sec. Determine Tension in the rope and force exerted by the man on the floor.

- b) Determine the constant force P that will give the system of bodies as shown Figure, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3 , pulleys are smooth



Fig(v)

- c) Determine the polar moment of inertia about centroidal axes of the I-Section as shown in the figure. (All dimensions are in mm.)



Seat No.	
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Max. Marks: 70

Marks: 14

14

- Page 11 of 20

- 8) In a perfect frame, relation between number of joints (j) and number of members (n) is given by _____.
a) $j = 2n - 3$
b) $n = 2j - 3$
c) $j = 2 - 3n$
d) $n = j - 6$
- 9) A beam 10 m long carries uniformly distributed load of 8 kN/m and supported at its two ends. What is the reaction at each support?
a) 8 kN
b) 80 kN
c) 40 kN
d) 4 kN
- 10) The area under v-t curve represents _____.
a) average velocity of particles
b) instantaneous velocity of particle
c) distance travelled by particle
d) acceleration of particle
- 11) When a ball is thrown in upward direction when it reaches maximum height its velocity will be _____.
a) maximum
b) minimum
c) zero
d) None of these
- 12) The unit of M.I. of an area is _____.
a) kg m^2
b) kg ms^2
c) kg/m^2
d) m^4
- 13) What is the initial velocity of an object which travels a distance of $10t^2 + 15t + 5$ along a straight line in time t?
a) -10
b) +10
c) -15
d) +15
- 14) A car is travelling at a speed of 90 km/h. Brakes are applied so as to produce a uniform acceleration of -0.5 m/s^2 . Find how far the car will go before it is brought to rest?
a) 8100 m
b) 900 m
c) 625 m
d) 620 m

Seat No.	
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Set **R**

F.Y. (B Tech) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mechanics (BTCE0106) / (BTCSE0106)
/ (BTETE0106) / (BTEE0106) / (BTME0106)

Day & Date: Wednesday, 15-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

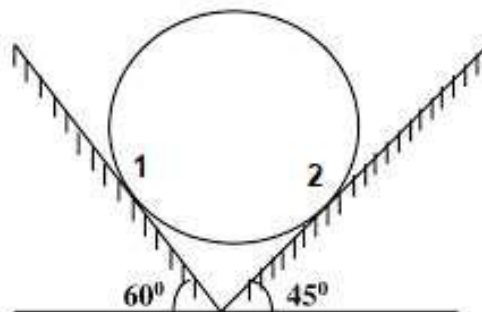
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever needed & mention it clearly.
 4) Draw neat sketches wherever necessary.

Section – I

Q.2 Attempt any four the following questions.

12

- State and derive Varignon's theorem of moment.
- Explain types of beam with neat sketches.
- Explain the term:
 - Perfect frame
 - Deficient frame
 - Redundant frame
- A 400 N sphere is resting in a trough as shown in figure. Determine reactions developed at contact surfaces. Assume all the contact surfaces are smooth.

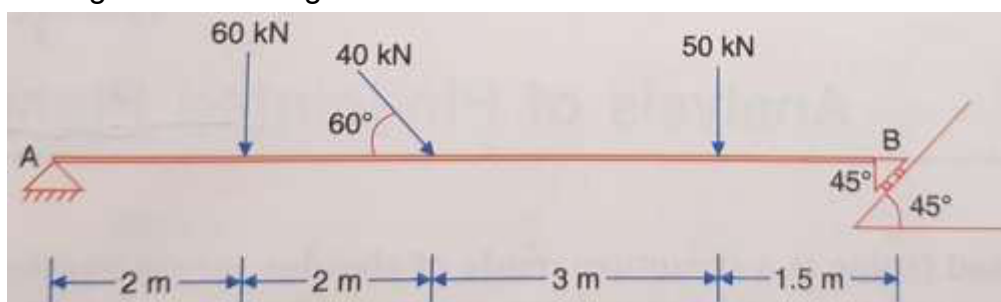


- Distinguish between angular motion and linear motion.
- Explain motion curves.

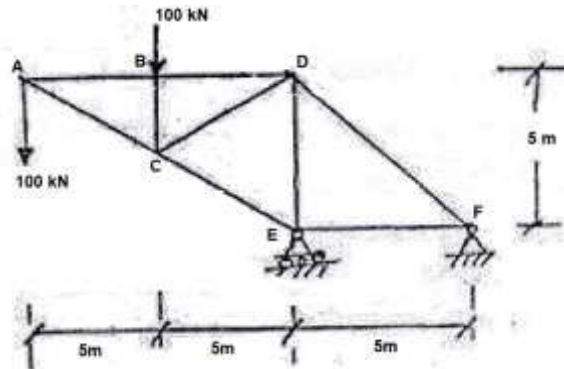
Q.3 Attempt any two the following questions.

16

- Beam AB, 8.5 m long, is hinged at A and has roller support at B. The roller support is inclined at 45° to the horizontal. Find the reactions at A and B, if loads acting are shown in figure



- b) Find the forces in all members by using method of joints.



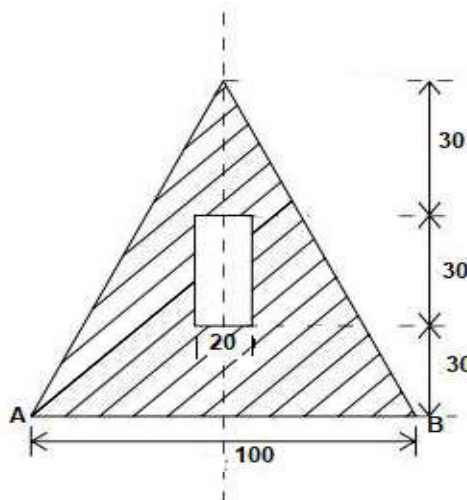
- c) The rotation of fly wheel is governed by the equation $\omega = 3t^2 - 2t + 2$. After one second from the start the angular displacement was 4 radians. Determine the angular displacement and angular velocity of the fly wheel $t = 3$ seconds.

Section – II

Q.4 Attempt any four of the following question.

12

- State and explain D' Alembert's principle of linear motion.
- What do you understand by the condition of dynamic equilibrium?
- Explain work energy principle.
- Define the terms
 - 1) Velocity of projection
 - 2) Angle of projection
 - 3) Horizontal Range
- State and prove perpendicular axes theorem.
- Determine the location of centroid of the lamina shown in Fig.

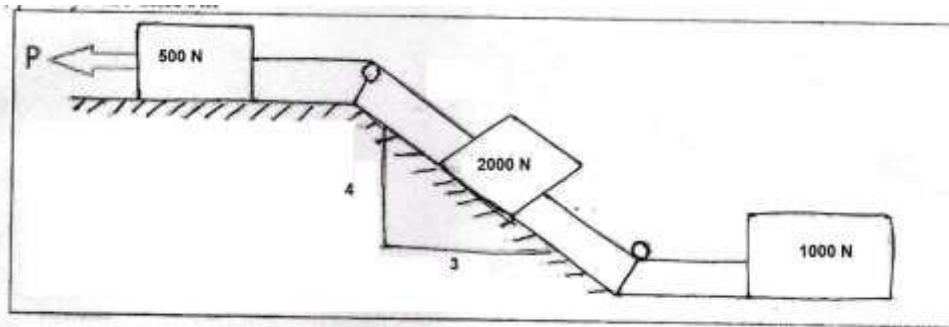


Q.5 Attempt any two of the following question.

16

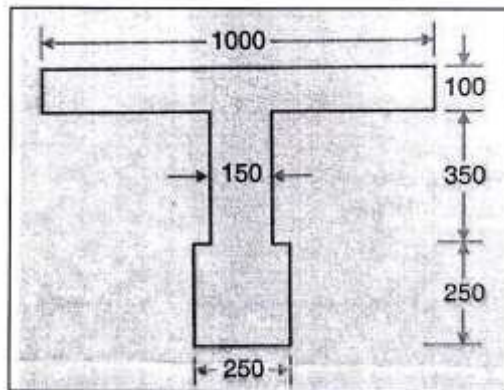
- An elevator cage of mine shaft weighing 8 kN, when empty, is lifted and lowered by means of a wire rope. Once man weighing, 600 N, entered it and lowered with uniform acceleration such that a distance of 187.5 m was covered, the velocity of the cage was 25 m/sec. Determine Tension in the rope and force exerted by the man on the floor.

- b) Determine the constant force P that will give the system of bodies as shown Figure, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3 , pulleys are smooth



Fig(v)

- c) Determine the polar moment of inertia about centroidal axes of the I-Section as shown in the figure. (All dimensions are in mm.)



Seat No.	
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Set	S
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**F.Y. (B Tech) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mechanics (BTCE0106)/ (BTCSE0106) / (BTETE0106)/
(BTEE0106)/ (BTME0106)**

Day & Date: Wednesday, 15-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data wherever needed & mention it clearly.
5) Draw neat sketches wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Solve following Multiple-Choice Questions.

14

- 1) The area under v-t curve represents _____.
a) average velocity of particles
b) instantaneous velocity of particle
c) distance travelled by particle
d) acceleration of particle
- 2) When a ball is thrown in upward direction when it reaches maximum height its velocity will be _____.
a) maximum
b) minimum
c) zero
d) None of these
- 3) The unit of M.I. of an area is _____.
a) kg m^2
b) kg ms^2
c) kg/m^2
d) m^4
- 4) What is the initial velocity of an object which travels a distance of $10t^2 + 15t + 5$ along a straight line in time t?
a) -10
b) +10
c) -15
d) +15
- 5) A car is travelling at a speed of 90 km/h. Brakes are applied so as to produce a uniform acceleration of -0.5 m/s^2 . Find how far the car will go before it is brought to rest?
a) 8100 m
b) 900 m
c) 625 m
d) 620 m
- 6) When the speed of particle is doubled, its kinetic energy _____.
a) Remains same
b) Increase two fold
c) Increase three fold
d) Increase four fold
- 7) Work energy method relates _____.
a) Force, acceleration and time
b) Force, velocity and time
c) Force, velocity and displacement
d) Force, displacement and time

Seat No.	
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Set **S**

F.Y. (B Tech) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Mechanics (BTCE0106) / (BTCSE0106)
/ (BTETE0106) / (BTEE0106) / (BTME0106)

Day & Date: Wednesday, 15-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

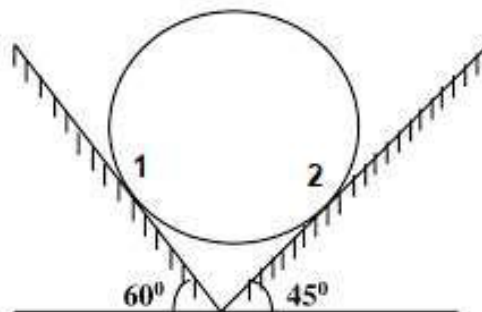
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever needed & mention it clearly.
 4) Draw neat sketches wherever necessary.

Section – I

Q.2 Attempt any four the following questions.

12

- State and derive Varignon's theorem of moment.
- Explain types of beam with neat sketches.
- Explain the term:
 - Perfect frame
 - Deficient frame
 - Redundant frame
- A 400 N sphere is resting in a trough as shown in figure. Determine reactions developed at contact surfaces. Assume all the contact surfaces are smooth.

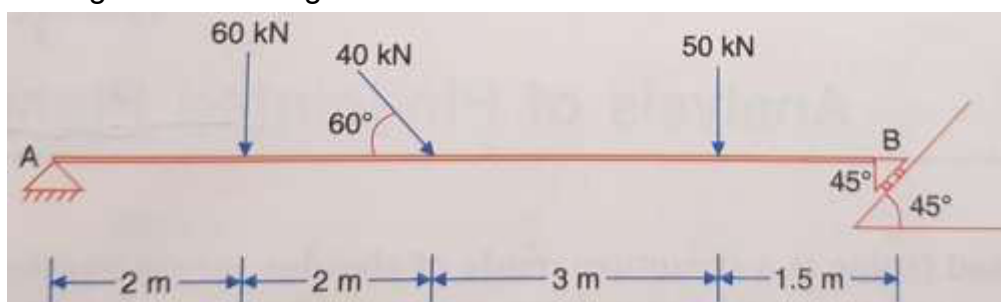


- Distinguish between angular motion and linear motion.
- Explain motion curves.

Q.3 Attempt any two the following questions.

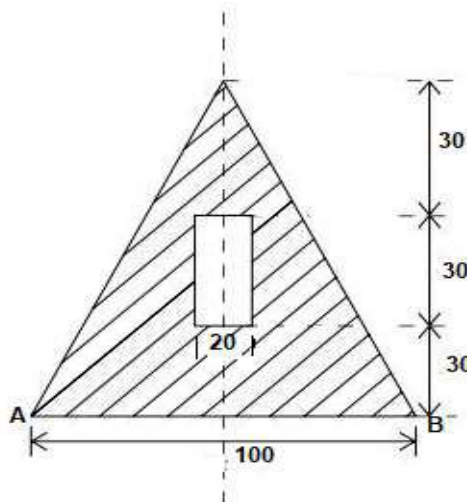
16

- Beam AB, 8.5 m long, is hinged at A and has roller support at B. The roller support is inclined at 45° to the horizontal. Find the reactions at A and B, if loads acting are shown in figure



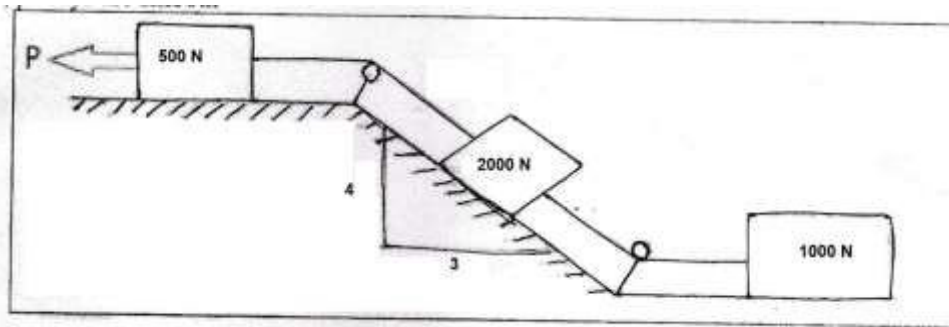
Section – II

12



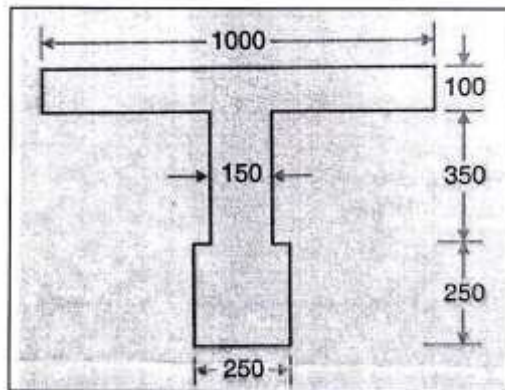
16

- b) Determine the constant force P that will give the system of bodies as shown Figure, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3 , pulleys are smooth



Fig(v)

- c) Determine the polar moment of inertia about centroidal axes of the I-Section as shown in the figure. (All dimensions are in mm.)



Seat No.	
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Day & Date: Saturday, 25-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicate full marks.
4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Donor type semiconductor is formed by adding impurity of valency _____.
a) 3
b) 5
c) 4
d) 6
- 2) The band gap energy of silicon (Si) is approximately _____.
a) 0.3 eV
b) 1.1 eV
c) 0.7 eV
d) 2.1 eV
- 3) Total axes of symmetry for cubic structure is _____.
a) 3
b) 6
c) 9
d) 13
- 4) The co-ordination number in case of BCC structure is _____.
a) 6
b) 12
c) 8
d) 10
- 5) The Bragg's law equation is _____.
a) $2d \sin \theta = d\lambda$
b) $3d \sin \theta = d\lambda$
c) $2d \sin \theta = n.\lambda$
d) $d \sin \theta = n.\lambda$
- 6) Optimum reverberation time for speech is _____.
a) 0.5 to 1 sec
b) 0.5 to 2 sec
c) 1 to 2 sec
d) 2 to 3 sec
- 7) The sound waves with frequency less than 20 Hz are called _____.
a) audible waves
b) infrasonic waves
c) ultrasonic waves
d) Above all
- 8) Bending of the light at corners of slit and penetration of waves into the regions of geometrical shadow is known as _____.
a) polarization
b) diffraction
c) dispersion
d) interference

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics/(BTCE0101)/(BTCSE0101)/ (BTETE0101)/
(BTEE0101)/ (BTME0101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any six of the following:

18

- Derive an expression for Fermi energy in intrinsic semiconductors $E_F = \frac{E_g}{2}$
- Define: valence band, conduction band and energy gap. Represent with neat diagram.
- Explain: Bragg's law
- Define co-ordination number. Obtain co-ordination number for SC and FCC.
- Explain:
 - Magnetostriction effect, and
 - Piezo-electric effect
- Write applications of Ultrasonic waves.
- A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B = 1.5 \text{ wb/m}^2$. If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$
- Determine the lattice constant for FCC lead crystal of radius 1.746 \AA . Also find the spacing of,
 - (200) planes,
 - (111) planes

Q.3 Attempt any TWO of the following:

10

- What is Hall effect? Derive the relation for Hall voltage (V_H) and Hall coefficient (R_H).
- Explain the term Miller indices. Derive the relation between lattice constant and interplanar spacing for cubic crystal.

$$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

- State and explain the factors affecting the architectural acoustics and their remedies.
- Calculate the inter-planer spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .
 - A classroom has dimensions $20 \times 15 \times 5 \text{ m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.

Section – II

Q.4 Attempt any SIX of the following.**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) State and explain: Maudslaw's law.
- c) Explain:
 - i) Stimulated Emission and
 - ii) Spontaneous Emission
- d) State properties of LASER.
- e) Explain structure of optical fibers with neat labeled diagrams.
- f) Explain: Types of carbon nano tubes (CNTs).
- g) How many orders will be visible if the wavelength of the incident radiation is 6500 Å and the number of lines/cm on the grating is 5000.
- h) Calculate the numerical aperture and acceptance angle for an optical fibre with core and cladding refractive indices being 1.48 and 1.40 respectively.

Q.5 Attempt any TWO of the following:**10**

- a) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- b) What is diffraction grating? Derive an expression for the resolving power of a diffraction grating ($\lambda/d\lambda = n.N$).
- c)
 - i) Calculate specific rotation, if the plane of polarization is rotated through 25° . Length of tube is 20 cm. Given: concentration of sugar solution 20%.
 - ii) Determine NA of a step index fibre when core refractive index $n_1 = 1.5$ and cladding refractive index $n_2 = 1.48$. Find maximum angle for entrance of light if fibre is placed in air.
- d) Explain: He-Ne gas laser with neat energy and transition diagram.

Seat No.	
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Day & Date: Saturday, 25-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicate full marks.
4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Marks: 14

14

- 1) Bending of the light at corners of slit and penetration of waves into the regions of geometrical shadow is known as _____.
a) polarization b) diffraction
c) dispersion d) interference
- 2) Along optic axis, the speed of o-ray and e-ray is _____.
a) $V_e = V_o$ b) $V_e > V_o$
c) $V_e < V_o$ d) None of these
- 3) The process of supplying energy to the laser medium with a view of transfer it into the state of population inversion is known as _____.
a) depumping b) lasing action
c) population inversion d) pumping
- 4) In He-Ne lasers, the ratio of He-Ne is in the order _____.
a) 1:10 b) 10:1
c) 1:1 d) 100:1
- 5) Holography means _____.
a) To get zero dimension image b) To get 2D image of 3D object
c) To get 3D image of 3D object d) To get 3D image of 2D object
- 6) The critical angle Φ_c for fiber optics is _____.
a) $\sin\left(\frac{n_1}{n_2}\right)$ b) $\sin^{-1}\left(\frac{n_1}{n_2}\right)$
c) $\sin\left(\frac{n_2}{n_1}\right)$ d) $\sin^{-1}\left(\frac{n_2}{n_1}\right)$
- 7) Dimensions of nanomaterials ranging from _____.
a) 1 to 100 nm b) 2 to 5 nm
c) 100 to 150 nm d) 0.1 to 5 nm

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics/(BTCE0101)/(BTCSE0101)/ (BTETE0101)/
(BTEE0101)/ (BTME0101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any six of the following:

18

- Derive an expression for Fermi energy in intrinsic semiconductors $E_F = \frac{E_g}{2}$
- Define: valence band, conduction band and energy gap. Represent with neat diagram.
- Explain: Bragg's law
- Define co-ordination number. Obtain co-ordination number for SC and FCC.
- Explain:
 - Magnetostriction effect, and
 - Piezo-electric effect
- Write applications of Ultrasonic waves.
- A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B = 1.5 \text{ wb/m}^2$. If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$
- Determine the lattice constant for FCC lead crystal of radius 1.746 \AA . Also find the spacing of,
 - (200) planes,
 - (111) planes

Q.3 Attempt any TWO of the following:

10

- What is Hall effect? Derive the relation for Hall voltage (V_H) and Hall coefficient (R_H).
- Explain the term Miller indices. Derive the relation between lattice constant and interplanar spacing for cubic crystal.

$$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

- State and explain the factors affecting the architectural acoustics and their remedies.
- Calculate the inter-planer spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .
 - A classroom has dimensions $20 \times 15 \times 5 \text{ m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.

Section – II

Q.4 Attempt any SIX of the following.**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) State and explain: Maudslaw's law.
- c) Explain:
 - i) Stimulated Emission and
 - ii) Spontaneous Emission
- d) State properties of LASER.
- e) Explain structure of optical fibers with neat labeled diagrams.
- f) Explain: Types of carbon nano tubes (CNTs).
- g) How many orders will be visible if the wavelength of the incident radiation is 6500 Å and the number of lines/cm on the grating is 5000.
- h) Calculate the numerical aperture and acceptance angle for an optical fibre with core and cladding refractive indices being 1.48 and 1.40 respectively.

Q.5 Attempt any TWO of the following:**10**

- a) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- b) What is diffraction grating? Derive an expression for the resolving power of a diffraction grating ($\lambda/d\lambda = n.N$).
- c)
 - i) Calculate specific rotation, if the plane of polarization is rotated through 25° . Length of tube is 20 cm. Given: concentration of sugar solution 20%.
 - ii) Determine NA of a step index fibre when core refractive index $n_1 = 1.5$ and cladding refractive index $n_2 = 1.48$. Find maximum angle for entrance of light if fibre is placed in air.
- d) Explain: He-Ne gas laser with neat energy and transition diagram.

Seat No.	
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Max. Marks: 70

Marks: 14

14

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics/(BTCE0101)/(BTCSE0101)/ (BTETE0101)/
(BTEE0101)/ (BTME0101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any six of the following:

18

- Derive an expression for Fermi energy in intrinsic semiconductors $E_F = \frac{E_g}{2}$
- Define: valence band, conduction band and energy gap. Represent with neat diagram.
- Explain: Bragg's law
- Define co-ordination number. Obtain co-ordination number for SC and FCC.
- Explain:
 - Magnetostriction effect, and
 - Piezo-electric effect
- Write applications of Ultrasonic waves.
- A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B = 1.5 \text{ wb/m}^2$. If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$
- Determine the lattice constant for FCC lead crystal of radius 1.746 \AA . Also find the spacing of,
 - (200) planes,
 - (111) planes

Q.3 Attempt any TWO of the following:

10

- What is Hall effect? Derive the relation for Hall voltage (V_H) and Hall coefficient (R_H).
- Explain the term Miller indices. Derive the relation between lattice constant and interplanar spacing for cubic crystal.

$$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

- State and explain the factors affecting the architectural acoustics and their remedies.
- Calculate the inter-planer spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .
 - A classroom has dimensions $20 \times 15 \times 5 \text{ m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.

Section – II

Q.4 Attempt any SIX of the following.**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) State and explain: Maudslaw's law.
- c) Explain:
 - i) Stimulated Emission and
 - ii) Spontaneous Emission
- d) State properties of LASER.
- e) Explain structure of optical fibers with neat labeled diagrams.
- f) Explain: Types of carbon nano tubes (CNTs).
- g) How many orders will be visible if the wavelength of the incident radiation is 6500 Å and the number of lines/cm on the grating is 5000.
- h) Calculate the numerical aperture and acceptance angle for an optical fibre with core and cladding refractive indices being 1.48 and 1.40 respectively.

Q.5 Attempt any TWO of the following:**10**

- a) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- b) What is diffraction grating? Derive an expression for the resolving power of a diffraction grating ($\lambda/d\lambda = n.N$).
- c)
 - i) Calculate specific rotation, if the plane of polarization is rotated through 25° . Length of tube is 20 cm. Given: concentration of sugar solution 20%.
 - ii) Determine NA of a step index fibre when core refractive index $n_1 = 1.5$ and cladding refractive index $n_2 = 1.48$. Find maximum angle for entrance of light if fibre is placed in air.
- d) Explain: He-Ne gas laser with neat energy and transition diagram.

Seat No.	
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Day & Date: Saturday, 25-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
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4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Optimum reverberation time for speech is _____.
a) 0.5 to 1 sec b) 0.5 to 2 sec
c) 1 to 2 sec d) 2 to 3 sec
- 2) The sound waves with frequency less than 20 Hz are called _____.
a) audible waves b) infrasonic waves
c) ultrasonic waves d) Above all
- 3) Bending of the light at corners of slit and penetration of waves into the regions of geometrical shadow is known as _____.
a) polarization b) diffraction
c) dispersion d) interference
- 4) Along optic axis, the speed of o-ray and e-ray is _____.
a) $V_e = V_o$ b) $V_e > V_o$
c) $V_e < V_o$ d) None of these
- 5) The process of supplying energy to the laser medium with a view of transfer it into the state of population inversion is known as _____.
a) depumping b) lasing action
c) population inversion d) pumping
- 6) In He-Ne lasers, the ratio of He-Ne is in the order _____.
a) 1:10 b) 10:1
c) 1:1 d) 100:1
- 7) Holography means _____.
a) To get zero dimension image b) To get 2D image of 3D object
c) To get 3D image of 3D object d) To get 3D image of 2D object

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics/(BTCE0101)/(BTCSE0101)/ (BTETE0101)/
(BTEE0101)/ (BTME0101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any six of the following:

18

- Derive an expression for Fermi energy in intrinsic semiconductors $E_F = \frac{E_g}{2}$
- Define: valence band, conduction band and energy gap. Represent with neat diagram.
- Explain: Bragg's law
- Define co-ordination number. Obtain co-ordination number for SC and FCC.
- Explain:
 - Magnetostriction effect, and
 - Piezo-electric effect
- Write applications of Ultrasonic waves.
- A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B = 1.5 \text{ wb/m}^2$. If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$
- Determine the lattice constant for FCC lead crystal of radius 1.746 \AA . Also find the spacing of,
 - (200) planes,
 - (111) planes

Q.3 Attempt any TWO of the following:

10

- What is Hall effect? Derive the relation for Hall voltage (V_H) and Hall coefficient (R_H).
- Explain the term Miller indices. Derive the relation between lattice constant and interplanar spacing for cubic crystal.

$$d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$$

- State and explain the factors affecting the architectural acoustics and their remedies.
- Calculate the inter-planer spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .
 - A classroom has dimensions $20 \times 15 \times 5 \text{ m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surfaces and the average absorption coefficient.

Section – II

Q.4 Attempt any SIX of the following.**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) State and explain: Maudslaw's law.
- c) Explain:
 - i) Stimulated Emission and
 - ii) Spontaneous Emission
- d) State properties of LASER.
- e) Explain structure of optical fibers with neat labeled diagrams.
- f) Explain: Types of carbon nano tubes (CNTs).
- g) How many orders will be visible if the wavelength of the incident radiation is 6500 Å and the number of lines/cm on the grating is 5000.
- h) Calculate the numerical aperture and acceptance angle for an optical fibre with core and cladding refractive indices being 1.48 and 1.40 respectively.

Q.5 Attempt any TWO of the following:**10**

- a) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- b) What is diffraction grating? Derive an expression for the resolving power of a diffraction grating ($\lambda/d\lambda = n.N$).
- c)
 - i) Calculate specific rotation, if the plane of polarization is rotated through 25° . Length of tube is 20 cm. Given: concentration of sugar solution 20%.
 - ii) Determine NA of a step index fibre when core refractive index $n_1 = 1.5$ and cladding refractive index $n_2 = 1.48$. Find maximum angle for entrance of light if fibre is placed in air.
- d) Explain: He-Ne gas laser with neat energy and transition diagram.

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) /(BTCSE0102) / (BTETE0102)/
(BTEE0102)/ (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labelled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Select correct option**14**

- 1) Permanent hardness of water cannot be removed by:

a) adding soda	b) distillation
c) boiling	d) adding lime-soda
- 2) Water is hard when it contains:

a) acid solution	b) precipitate in suspension
c) dissolved sodium salts	d) dissolved Ca and Mg salts
- 3) A semipermeable membrane allows the flow of:

a) solvent molecules	
b) solute molecules	
c) both solute and solvent molecules	
d) neither solute nor solvent molecules	
- 4) A suitable lubricant for watches is:

a) greases	b) graphite
c) Vegetable oil	d) Mineral Oil
- 5) Capacity of an oil to stick onto the surface of machine parts under conditions of heavy load, is called:

a) volatility	b) oiliness
c) acid value	d) flash point
- 6) During electrochemical corrosion in acidic environment:

a) oxygen evolution occurs	
b) oxygen absorption occurs	
c) hydrogen evolution takes place	
d) hydrogen absorption takes place	
- 7) The process of zinc coating over iron sheet by hot dipping is called _____.

a) Galvanizing	b) Tinning
c) Sheradizing	d) Anodizing

- 8)** An example of primary fuel is:
a) natural gas b) petrol
c) wood charcoal d) coke
- 9)** Charcoal is a secondary fuel derived from:
a) Wood b) Lignite
c) Petroleum d) coke
- 10)** GR-S rubber is an example of:
a) condensation polymerization
b) copolymerization
c) cross-linked polymerization
d) addition polymerization in which single monomer takes part
- 11)** Natural rubber is basically a polymer of:
a) isoprene b) propylene
c) ethylene d) propane
- 12)** Molecular mass of a polymer is:
a) small b) very small
c) large d) negligible
- 13)** Which of the following can be used for purification of substance?
a) IR spectroscopy b) UV spectroscopy
c) Gas chromatography d) Calorimetry
- 14)** Number of moles of solute present in a liter of solution is called:
a) Normality b) Molarity
c) Molality d) Mole fraction

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) / (BTCSE0102) / (BTETE0102) /
(BTEE0102) / (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	30.15	162
Mg(HCO ₃) ₂	38.73	146
MgSO ₄	34.10	120
CaCl ₂	33.90	111
MgCl ₂	36.5	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain semisolid lubricants
 d) Define following terms.
 i) Cloud point
 ii) Flash point
 iii) Aniline point
 iv) Acid value
 e) Define corrosion. Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any four:

12

- a) Define disinfection. Explain disinfection of water by chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) 7 gm of an oil sample after saponification with 55 ml of N/2 alcoholic KOH solution and subsequent titration with N/2 HCl gave the titre value of 8 ml to phenolphthalein end point. A blank experiment was conducted without taking oil sample. On repeating same procedure gave a titer value of 55 ml. Calculate saponification value of an oil sample.
 e) Explain constituents of paints.
 f) Explain composition, properties and applications of steel.

Section – II

Q.4 Attempt any four:**16**

- a) Calculate gross and net calorific value of a coal sample of coal having C = 82%, H = 5%, O = 3%, S = 2.5%, N = 2.1% and ash = 4.4%. (Take latent heat of steam = 587 cal/g)
- b) Explain construction and working of Boy's calorimeter.
- c) Compare liquid and gaseous fuels.
- d) Define plastics. Explain thermosoftening and thermosetting plastics.
- e) Explain molding of plastics in to articles by following methods.
 - i) Compression molding
 - ii) Transfer molding
- f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any four:**12**

- a) Explain Types of Batteries.
- b) Define Fuel. Explain classification of fuels.
- c) Explain synthesis, properties and applications of PET.
- d) Describe biodegradable polymer. Discuss any two examples of biodegradable polymers with applications.
- e) Calculate Molecular weight of polyvinyl chloride having degree of polymerization 350.
- f) Calculate weight of Na_2CO_3 required to prepare 0.3 M 700 ml solution. (Mol. Wt. of Na_2CO_3 = 106)

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) /(BTCSE0102) / (BTETE0102)/
(BTEE0102)/ (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Select correct option**14**

- 1) An example of primary fuel is:

a) natural gas	b) petrol
c) wood charcoal	d) coke
- 2) Charcoal is a secondary fuel derived from:

a) Wood	b) Lignite
c) Petroleum	d) coke
- 3) GR-S rubber is an example of:

a) condensation polymerization	
b) copolymerization	
c) cross-linked polymerization	
d) addition polymerization in which single monomer takes part	
- 4) Natural rubber is basically a polymer of:

a) isoprene	b) propylene
c) ethylene	d) propane
- 5) Molecular mass of a polymer is:

a) small	b) very small
c) large	d) negligible
- 6) Which of the following can be used for purification of substance?

a) IR spectroscopy	b) UV spectroscopy
c) Gas chromatography	d) Calorimetry
- 7) Number of moles of solute present in a liter of solution is called:

a) Normality	b) Molarity
c) Molality	d) Mole fraction
- 8) Permanent hardness of water cannot be removed by:

a) adding soda	b) distillation
c) boiling	d) adding lime-soda

- 9) Water is hard when it contains:
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 - b) precipitate in suspension
 - c) dissolved sodium salts
 - d) dissolved Ca and Mg salts
- 10) A semipermeable membrane allows the flow of:
- a) solvent molecules
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 - c) both solute and solvent molecules
 - d) neither solute nor solvent molecules
- 11) A suitable lubricant for watches is:
- a) greases
 - b) graphite
 - c) Vegetable oil
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- 12) Capacity of an oil to stick onto the surface of machine parts under conditions of heavy load, is called:
- a) volatility
 - b) oiliness
 - c) acid value
 - d) flash point
- 13) During electrochemical corrosion in acidic environment:
- a) oxygen evolution occurs
 - b) oxygen absorption occurs
 - c) hydrogen evolution takes place
 - d) hydrogen absorption takes place
- 14) The process of zinc coating over iron sheet by hot dipping is called ____.
- a) Galvanizing
 - b) Tinning
 - c) Sheradizing
 - d) Anodizing

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) / (BTCSE0102) / (BTETE0102) /
(BTEE0102) / (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
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Section – I

Q.2 Attempt any four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
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Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain semisolid lubricants
 d) Define following terms.
 i) Cloud point
 ii) Flash point
 iii) Aniline point
 iv) Acid value
 e) Define corrosion. Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any four:

12

- a) Define disinfection. Explain disinfection of water by chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) 7 gm of an oil sample after saponification with 55 ml of N/2 alcoholic KOH solution and subsequent titration with N/2 HCl gave the titre value of 8 ml to phenolphthalein end point. A blank experiment was conducted without taking oil sample. On repeating same procedure gave a titer value of 55 ml. Calculate saponification value of an oil sample.
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 f) Explain composition, properties and applications of steel.

Section – II

Q.4 Attempt any four:**16**

- a) Calculate gross and net calorific value of a coal sample of coal having C = 82%, H = 5%, O = 3%, S = 2.5%, N = 2.1% and ash = 4.4%. (Take latent heat of steam = 587 cal/g)
- b) Explain construction and working of Boy's calorimeter.
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- d) Define plastics. Explain thermosoftening and thermosetting plastics.
- e) Explain molding of plastics in to articles by following methods.
 - i) Compression molding
 - ii) Transfer molding
- f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any four:**12**

- a) Explain Types of Batteries.
- b) Define Fuel. Explain classification of fuels.
- c) Explain synthesis, properties and applications of PET.
- d) Describe biodegradable polymer. Discuss any two examples of biodegradable polymers with applications.
- e) Calculate Molecular weight of polyvinyl chloride having degree of polymerization 350.
- f) Calculate weight of Na_2CO_3 required to prepare 0.3 M 700 ml solution. (Mol. Wt. of Na_2CO_3 = 106)

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) /(BTCSE0102) / (BTETE0102)/
(BTEE0102)/ (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labelled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Select correct option**14**

- 1) Natural rubber is basically a polymer of:

a) isoprene	b) propylene
c) ethylene	d) propane
- 2) Molecular mass of a polymer is:

a) small	b) very small
c) large	d) negligible
- 3) Which of the following can be used for purification of substance?

a) IR spectroscopy	b) UV spectroscopy
c) Gas chromatography	d) Calorimetry
- 4) Number of moles of solute present in a liter of solution is called:

a) Normality	b) Molarity
c) Molality	d) Mole fraction
- 5) Permanent hardness of water cannot be removed by:

a) adding soda	b) distillation
c) boiling	d) adding lime-soda
- 6) Water is hard when it contains:

a) acid solution	b) precipitate in suspension
c) dissolved sodium salts	d) dissolved Ca and Mg salts
- 7) A semipermeable membrane allows the flow of:

a) solvent molecules	
b) solute molecules	
c) both solute and solvent molecules	
d) neither solute nor solvent molecules	
- 8) A suitable lubricant for watches is:

a) greases	b) graphite
c) Vegetable oil	d) Mineral Oil

- 9) Capacity of an oil to stick onto the surface of machine parts under conditions of heavy load, is called:
- a) volatility
 - b) oiliness
 - c) acid value
 - d) flash point
- 10) During electrochemical corrosion in acidic environment:
- a) oxygen evolution occurs
 - b) oxygen absorption occurs
 - c) hydrogen evolution takes place
 - d) hydrogen absorption takes place
- 11) The process of zinc coating over iron sheet by hot dipping is called ____.
- a) Galvanizing
 - b) Tinning
 - c) Sheradizing
 - d) Anodizing
- 12) An example of primary fuel is:
- a) natural gas
 - b) petrol
 - c) wood charcoal
 - d) coke
- 13) Charcoal is a secondary fuel derived from:
- a) Wood
 - b) Lignite
 - c) Petroleum
 - d) coke
- 14) GR-S rubber is an example of:
- a) condensation polymerization
 - b) copolymerization
 - c) cross-linked polymerization
 - d) addition polymerization in which single monomer takes part

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) / (BTCSE0102) / (BTETE0102) /
(BTEE0102) / (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	30.15	162
Mg(HCO ₃) ₂	38.73	146
MgSO ₄	34.10	120
CaCl ₂	33.90	111
MgCl ₂	36.5	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain semisolid lubricants
 d) Define following terms.
 i) Cloud point
 ii) Flash point
 iii) Aniline point
 iv) Acid value
 e) Define corrosion. Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any four:

12

- a) Define disinfection. Explain disinfection of water by chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) 7 gm of an oil sample after saponification with 55 ml of N/2 alcoholic KOH solution and subsequent titration with N/2 HCl gave the titre value of 8 ml to phenolphthalein end point. A blank experiment was conducted without taking oil sample. On repeating same procedure gave a titer value of 55 ml. Calculate saponification value of an oil sample.
 e) Explain constituents of paints.
 f) Explain composition, properties and applications of steel.

Section – II

Q.4 Attempt any four:**16**

- a) Calculate gross and net calorific value of a coal sample of coal having C = 82%, H = 5%, O = 3%, S = 2.5%, N = 2.1% and ash = 4.4%. (Take latent heat of steam = 587 cal/g)
- b) Explain construction and working of Boy's calorimeter.
- c) Compare liquid and gaseous fuels.
- d) Define plastics. Explain thermosoftening and thermosetting plastics.
- e) Explain molding of plastics in to articles by following methods.
 - i) Compression molding
 - ii) Transfer molding
- f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any four:**12**

- a) Explain Types of Batteries.
- b) Define Fuel. Explain classification of fuels.
- c) Explain synthesis, properties and applications of PET.
- d) Describe biodegradable polymer. Discuss any two examples of biodegradable polymers with applications.
- e) Calculate Molecular weight of polyvinyl chloride having degree of polymerization 350.
- f) Calculate weight of Na_2CO_3 required to prepare 0.3 M 700 ml solution. (Mol. Wt. of Na_2CO_3 = 106)

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) /(BTCSE0102) / (BTETE0102)/
(BTEE0102)/ (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labelled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Select correct option**14**

- 1) During electrochemical corrosion in acidic environment:
 - a) oxygen evolution occurs
 - b) oxygen absorption occurs
 - c) hydrogen evolution takes place
 - d) hydrogen absorption takes place
- 2) The process of zinc coating over iron sheet by hot dipping is called _____.
 - a) Galvanizing
 - b) Tinning
 - c) Sheradizing
 - d) Anodizing
- 3) An example of primary fuel is:
 - a) natural gas
 - b) petrol
 - c) wood charcoal
 - d) coke
- 4) Charcoal is a secondary fuel derived from:
 - a) Wood
 - b) Lignite
 - c) Petroleum
 - d) coke
- 5) GR-S rubber is an example of:
 - a) condensation polymerization
 - b) copolymerization
 - c) cross-linked polymerization
 - d) addition polymerization in which single monomer takes part
- 6) Natural rubber is basically a polymer of:
 - a) isoprene
 - b) propylene
 - c) ethylene
 - d) propane
- 7) Molecular mass of a polymer is:
 - a) small
 - b) very small
 - c) large
 - d) negligible
- 8) Which of the following can be used for purification of substance?
 - a) IR spectroscopy
 - b) UV spectroscopy
 - c) Gas chromatography
 - d) Calorimetry

- 9)** Number of moles of solute present in a liter of solution is called:

 - a) Normality
 - b) Molarity
 - c) Molality
 - d) Mole fraction
- 10)** Permanent hardness of water cannot be removed by:

 - a) adding soda
 - b) distillation
 - c) boiling
 - d) adding lime-soda
- 11)** Water is hard when it contains:

 - a) acid solution
 - b) precipitate in suspension
 - c) dissolved sodium salts
 - d) dissolved Ca and Mg salts
- 12)** A semipermeable membrane allows the flow of:

 - a) solvent molecules
 - b) solute molecules
 - c) both solute and solvent molecules
 - d) neither solute nor solvent molecules
- 13)** A suitable lubricant for watches is:

 - a) greases
 - b) graphite
 - c) Vegetable oil
 - d) Mineral Oil
- 14)** Capacity of an oil to stick onto the surface of machine parts under conditions of heavy load, is called:

 - a) volatility
 - b) oiliness
 - c) acid value
 - d) flash point

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry \$ (BTCE0102) / (BTCSE0102) / (BTETE0102) /
(BTEE0102) / (BTME0102)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All question are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
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MgSO ₄	34.10	120
CaCl ₂	33.90	111
MgCl ₂	36.5	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain semisolid lubricants
 d) Define following terms.
 i) Cloud point
 ii) Flash point
 iii) Aniline point
 iv) Acid value
 e) Define corrosion. Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any four:

12

- a) Define disinfection. Explain disinfection of water by chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) 7 gm of an oil sample after saponification with 55 ml of N/2 alcoholic KOH solution and subsequent titration with N/2 HCl gave the titre value of 8 ml to phenolphthalein end point. A blank experiment was conducted without taking oil sample. On repeating same procedure gave a titer value of 55 ml. Calculate saponification value of an oil sample.
 e) Explain constituents of paints.
 f) Explain composition, properties and applications of steel.

Section – II

Q.4 Attempt any four:**16**

- a) Calculate gross and net calorific value of a coal sample of coal having C = 82%, H = 5%, O = 3%, S = 2.5%, N = 2.1% and ash = 4.4%. (Take latent heat of steam = 587 cal/g)
- b) Explain construction and working of Boy's calorimeter.
- c) Compare liquid and gaseous fuels.
- d) Define plastics. Explain thermosoftening and thermosetting plastics.
- e) Explain molding of plastics in to articles by following methods.
 - i) Compression molding
 - ii) Transfer molding
- f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any four:**12**

- a) Explain Types of Batteries.
- b) Define Fuel. Explain classification of fuels.
- c) Explain synthesis, properties and applications of PET.
- d) Describe biodegradable polymer. Discuss any two examples of biodegradable polymers with applications.
- e) Calculate Molecular weight of polyvinyl chloride having degree of polymerization 350.
- f) Calculate weight of Na_2CO_3 required to prepare 0.3 M 700 ml solution. (Mol. Wt. of Na_2CO_3 = 106)

Seat No.	
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Set	P
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F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0104)/ (BTCSE0104) / (BTETE0104)/ (BTEE0104)/ (BTME0104)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if necessary and mention them clearly.
 5) Use of non-programmable single memory calculator is allowed.

Section - I

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following. 07

- 1) Following is the sub branch of Civil Engineering deals with air pollution and water supply _____.
 a) Geotechnical Engineering b) Environmental Engineering
 c) Transportation Engineering d) Structural Engineering
- 2) For removal of Floating matters like leaves, dead animals, which treatment process is used?
 a) Softening b) Sedimentation
 c) None of these d) Screening
- 3) The method of surveying used for determining the relative heights of points on the surface of the earth is called _____.
 a) Levelling b) Simple levelling
 c) Longitudinal levelling d) Differential levelling
- 4) Which of the following vehicle is used for collecting solid waste from narrow localities _____.
 a) Auto rickshaw b) Trailers
 b) Truck d) None of the above
- 5) The lowermost part of a structure which transmits the load to the soil is known as _____.
 a) Superstructure b) Plinth
 c) Foundation d) Basement
- 6) "A powerful set of tools for collecting, retrieving at well, transforming and displaying spatial data from the real world for a particular set of purpose" is called as _____.
 a) Geo-technology b) GIS
 c) GPS d) Geoinformatics

- 7) Green city concept encourages _____.
a) Mass transportation
b) Pollution free city
c) Use of non conventional energy
d) All the above

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0104)/ (BTCSE0104) / (BTETE0104)/ (BTEE0104)/ (BTME0104)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
 6) Q.No.3 and Q.No.5 are long answer type question.

Section – I

- Q.2 Attempt any Five. 15**
- a) Explain application of Civil Engineering to Textile Engineering. **03**
 - b) Explain Rain Water Harvesting with neat sketch. **03**
 - c) Define Civil Engineering? Enlist sub branches of civil engineering? Explain any one in short. **03**
 - d) Draw a functional cross section of road in embankment. **03**
 - e) What is GIS? Give its applications in various fields. **03**
 - f) Explain Operation of Water treatment plant. **03**
 - g) Write note on Hydrological cycle. **03**
- Q.3 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) The following consecutive readings were taken with a dumpy level. **05**
 1.580, 0.635, 2.035, 1.765, 1.660, 0.925, 1.035, 1.960. The level was shifted after 3rd and 5th readings. The first reading was taken on the bench mark of RL 950.000. Calculate the reduced levels of the change points and the difference of level between first and last points. (Use Rise and Fall method.)
 - b) During levelling following staff readings are taken, **05**
 Reading taken successively on staff position in a levelling work are 2.065, 1.470, 1.250, 3.195, 2.455. Level was shifted after second reading. If R. L. of first position of staff is 250.00M, find R.L. of other staff positions. Use rise and fall method. Show arithmetical check and sample calculation.
 - c) What is the classification of foundation? Explain any one in details. **04**
 - d) Differentiate between Load bearing structure and Framed structure. **04**
 - e) Draw a neat sketch of showing all parts of super structure and sub-structure. **04**
 - f) Explain the classification of road transport. **04**

Section – II

- Q.4 Answer any five of the following. 15**
- a) Distinguish between Rotary Compressor and Reciprocating Compressor. 03
 - b) Explain working of Kaplan Turbine. 03
 - c) Explain Brazing process with neat sketch. 03
 - d) State and explain the second law of thermodynamics. 03
 - e) Write short notes on 03
 - i) Spur Gear
 - ii) Bevel gear
 - f) Explain PdV work in detail 03
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE, 03
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) Two pulleys having diameters 2m and 1.5 m are separated by a distance of 5 m. the initial tension in the belt is 3kN. The coefficient of friction between the belt and the pulley is 0.3. Calculate the power transmitted by the open belt, when the smaller pulley rotates at 200 rpm. 05
 - b) Describe Lathe Machine with its neat Sketch. 05
 - c) A cycle comprises three processes. The energy transfers in each are tabulated below. Complete the table. 04
- | Process | Q (KJ) | W (KJ) | ΔU (KJ) |
|---------|--------|--------|-----------------|
| 1-2 | +80 | +30 | --- |
| 2-3 | --- | -50 | +20 |
| 3-1 | +50 | --- | --- |
- d) Explain with neat sketch construction & working of Centrifugal Pump. 04
 - e) Derive an expression for length of belt for open belt drive. 04
 - f) Explain Oxy-Acetylene Gas welding in detail. 04

Seat No.	
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Day & Date: Wednesday, 29-05-2024
Time: 10:00 AM To 1:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of non-programmable single memory calculator is allowed.

Marks: 07

07

- Page 6 of 20

- 7) Which of the following vehicle is used for collecting solid waste from narrow localities _____.
- | | |
|------------------|----------------------|
| a) Auto rickshaw | b) Trailers |
| b) Truck | d) None of the above |

Section – II**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:07

Q.1 Choose the correct alternatives from the given options.**07**

- 1) Gears used to connect two non-parallel and intersecting shafts at right angles to each other.
 - a) Spiral gears
 - b) Spur gears
 - c) Bevel gears
 - d) Helical gears
- 2) During a cycle, the heat transfer are given by: 120kJ, -60kJ, -48kJ, and 12kJ then the network transfer the cycle is _____.
 - a) 60000 Nm
 - b) 24000 Nm
 - c) 12000 Nm
 - d) 4400 Nm
- 3) It is impossible to construct a device which operating in a cycle will produce no effect other than the transfer of heat from a colder body to hotter body.
 - a) Kelvin plank law
 - b) Clausius law
 - c) Carnot theorem
 - d) none
- 4) _____ is a device which lifts or transfers liquids from low level to high level at the expense of power input.
 - a) Pumps
 - b) Turbines
 - c) Compressors
 - d) None
- 5) Which of the following operations can be performed by a drilling machine?
 - a) spot facing
 - b) Reaming
 - c) Tapping
 - d) all of these
- 6) In spot welding, the tip of electrode is of _____.
 - a) Stainless steel
 - b) Copper
 - c) Aluminum
 - d) Brass
- 7) When two pulleys of different diameters are connected by mean of an open belt, the angle of contact considered must be on the _____.
 - a) smaller pulley
 - b) large pulley
 - c) average of two pulleys
 - d) none of the above

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0104)/ (BTCSE0104) / (BTETE0104)/ (BTEE0104)/ (BTME0104)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
 6) Q.No.3 and Q.No.5 are long answer type question.

Section – I

- Q.2 Attempt any Five.** **15**
- Explain application of Civil Engineering to Textile Engineering. **03**
 - Explain Rain Water Harvesting with neat sketch. **03**
 - Define Civil Engineering? Enlist sub branches of civil engineering? Explain any one in short. **03**
 - Draw a functional cross section of road in embankment. **03**
 - What is GIS? Give its applications in various fields. **03**
 - Explain Operation of Water treatment plant. **03**
 - Write note on Hydrological cycle. **03**
- Q.3 Solve any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- The following consecutive readings were taken with a dumpy level. **05**
 1.580, 0.635, 2.035, 1.765, 1.660, 0.925, 1.035, 1.960. The level was shifted after 3rd and 5th readings. The first reading was taken on the bench mark of RL 950.000. Calculate the reduced levels of the change points and the difference of level between first and last points. (Use Rise and Fall method.)
 - During levelling following staff readings are taken, **05**
 Reading taken successively on staff position in a levelling work are 2.065, 1.470, 1.250, 3.195, 2.455. Level was shifted after second reading. If R. L. of first position of staff is 250.00M, find R.L. of other staff positions. Use rise and fall method. Show arithmetical check and sample calculation.
 - What is the classification of foundation? Explain any one in details. **04**
 - Differentiate between Load bearing structure and Framed structure. **04**
 - Draw a neat sketch of showing all parts of super structure and sub-structure. **04**
 - Explain the classification of road transport. **04**

Section – II

- Q.4 Answer any five of the following.** **15**
- a) Distinguish between Rotary Compressor and Reciprocating Compressor. **03**
 - b) Explain working of Kaplan Turbine. **03**
 - c) Explain Brazing process with neat sketch. **03**
 - d) State and explain the second law of thermodynamics. **03**
 - e) Write short notes on **03**
 - i) Spur Gear
 - ii) Bevel gear
 - f) Explain PdV work in detail **03**
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE, **03**
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- a) Two pulleys having diameters 2m and 1.5 m are separated by a distance of 5 m. the initial tension in the belt is 3kN. The coefficient of friction between the belt and the pulley is 0.3. Calculate the power transmitted by the open belt, when the smaller pulley rotates at 200 rpm. **05**
 - b) Describe Lathe Machine with its neat Sketch. **05**
 - c) A cycle comprises three processes. The energy transfers in each are tabulated below. Complete the table. **04**
- | Process | Q (KJ) | W (KJ) | ΔU (KJ) |
|---------|--------|--------|-----------------|
| 1-2 | +80 | +30 | --- |
| 2-3 | --- | -50 | +20 |
| 3-1 | +50 | --- | --- |
- d) Explain with neat sketch construction & working of Centrifugal Pump. **04**
 - e) Derive an expression for length of belt for open belt drive. **04**
 - f) Explain Oxy-Acetylene Gas welding in detail. **04**

Seat No.	
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Day & Date: Wednesday, 29-05-2024
Time: 10:00 AM To 1:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
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- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of non-programmable single memory calculator is allowed.

Marks: 07

07

- Page 11 of 20

- 7) For removal of Floating matters like leaves, dead animals, which treatment process is used?
- | | |
|------------------|------------------|
| a) Softening | b) Sedimentation |
| c) None of these | d) Screening |

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0104)/ (BTCSE0104) / (BTETE0104)/ (BTEE0104)/ (BTME0104)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
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Section – I

- Q.2 Attempt any Five. 15**
- a) Explain application of Civil Engineering to Textile Engineering. **03**
 - b) Explain Rain Water Harvesting with neat sketch. **03**
 - c) Define Civil Engineering? Enlist sub branches of civil engineering? Explain any one in short. **03**
 - d) Draw a functional cross section of road in embankment. **03**
 - e) What is GIS? Give its applications in various fields. **03**
 - f) Explain Operation of Water treatment plant. **03**
 - g) Write note on Hydrological cycle. **03**
- Q.3 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) The following consecutive readings were taken with a dumpy level. **05**
 1.580, 0.635, 2.035, 1.765, 1.660, 0.925, 1.035, 1.960. The level was shifted after 3rd and 5th readings. The first reading was taken on the bench mark of RL 950.000. Calculate the reduced levels of the change points and the difference of level between first and last points. (Use Rise and Fall method.)
 - b) During levelling following staff readings are taken, **05**
 Reading taken successively on staff position in a levelling work are 2.065, 1.470, 1.250, 3.195, 2.455. Level was shifted after second reading. If R. L. of first position of staff is 250.00M, find R.L. of other staff positions. Use rise and fall method. Show arithmetical check and sample calculation.
 - c) What is the classification of foundation? Explain any one in details. **04**
 - d) Differentiate between Load bearing structure and Framed structure. **04**
 - e) Draw a neat sketch of showing all parts of super structure and sub-structure. **04**
 - f) Explain the classification of road transport. **04**

Section – II

- Q.4 Answer any five of the following. 15**
- a) Distinguish between Rotary Compressor and Reciprocating Compressor. **03**
 - b) Explain working of Kaplan Turbine. **03**
 - c) Explain Brazing process with neat sketch. **03**
 - d) State and explain the second law of thermodynamics. **03**
 - e) Write short notes on **03**
 - i) Spur Gear
 - ii) Bevel gear
 - f) Explain PdV work in detail **03**
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE, **03**
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) Two pulleys having diameters 2m and 1.5 m are separated by a distance of 5 m. the initial tension in the belt is 3kN. The coefficient of friction between the belt and the pulley is 0.3. Calculate the power transmitted by the open belt, when the smaller pulley rotates at 200 rpm. **05**
 - b) Describe Lathe Machine with its neat Sketch. **05**
 - c) A cycle comprises three processes. The energy transfers in each are tabulated below. Complete the table. **04**
- | Process | Q (KJ) | W (KJ) | ΔU (KJ) |
|---------|--------|--------|-----------------|
| 1-2 | +80 | +30 | --- |
| 2-3 | --- | -50 | +20 |
| 3-1 | +50 | --- | --- |
- d) Explain with neat sketch construction & working of Centrifugal Pump. **04**
 - e) Derive an expression for length of belt for open belt drive. **04**
 - f) Explain Oxy-Acetylene Gas welding in detail. **04**

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0104)/ (BTCSE0104) / (BTETE0104)/ (BTEE0104)/ (BTME0104)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if necessary and mention them clearly.
 5) Use of non-programmable single memory calculator is allowed.

Section - I

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) Green city concept encourages _____.
 a) Mass transportation
 b) Pollution free city
 c) Use of non conventional energy
 d) All the above
- 2) Following is the sub branch of Civil Engineering deals with air pollution and water supply _____.
 a) Geotechnical Engineering b) Environmental Engineering
 c) Transportation Engineering d) Structural Engineering
- 3) For removal of Floating matters like leaves, dead animals, which treatment process is used?
 a) Softening b) Sedimentation
 c) None of these d) Screening
- 4) The method of surveying used for determining the relative heights of points on the surface of the earth is called _____.
 a) Levelling b) Simple levelling
 c) Longitudinal levelling d) Differential levelling
- 5) Which of the following vehicle is used for collecting solid waste from narrow localities _____.
 a) Auto rickshaw b) Trailers
 b) Truck d) None of the above
- 6) The lowermost part of a structure which transmits the load to the soil is known as _____.
 a) Superstructure b) Plinth
 c) Foundation d) Basement

- 7) “A powerful set of tools for collecting, retrieving at well, transforming and displaying spatial data from the real world for a particular set of purpose” is called as _____.
- | | |
|-------------------|-------------------|
| a) Geo-technology | b) GIS |
| c) GPS | d) Geoinformatics |

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0104)/ (BTCSE0104) / (BTETE0104)/ (BTEE0104)/ (BTME0104)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
 6) Q.No.3 and Q.No.5 are long answer type question.

Section – I

- Q.2 Attempt any Five.** **15**
- Explain application of Civil Engineering to Textile Engineering. **03**
 - Explain Rain Water Harvesting with neat sketch. **03**
 - Define Civil Engineering? Enlist sub branches of civil engineering? Explain any one in short. **03**
 - Draw a functional cross section of road in embankment. **03**
 - What is GIS? Give its applications in various fields. **03**
 - Explain Operation of Water treatment plant. **03**
 - Write note on Hydrological cycle. **03**
- Q.3 Solve any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- The following consecutive readings were taken with a dumpy level. **05**
 1.580, 0.635, 2.035, 1.765, 1.660, 0.925, 1.035, 1.960. The level was shifted after 3rd and 5th readings. The first reading was taken on the bench mark of RL 950.000. Calculate the reduced levels of the change points and the difference of level between first and last points. (Use Rise and Fall method.)
 - During levelling following staff readings are taken, **05**
 Reading taken successively on staff position in a levelling work are 2.065, 1.470, 1.250, 3.195, 2.455. Level was shifted after second reading. If R. L. of first position of staff is 250.00M, find R.L. of other staff positions. Use rise and fall method. Show arithmetical check and sample calculation.
 - What is the classification of foundation? Explain any one in details. **04**
 - Differentiate between Load bearing structure and Framed structure. **04**
 - Draw a neat sketch of showing all parts of super structure and sub-structure. **04**
 - Explain the classification of road transport. **04**

Section – II

- Q.4 Answer any five of the following. 15**
- a) Distinguish between Rotary Compressor and Reciprocating Compressor. 03
 - b) Explain working of Kaplan Turbine. 03
 - c) Explain Brazing process with neat sketch. 03
 - d) State and explain the second law of thermodynamics. 03
 - e) Write short notes on 03
 - i) Spur Gear
 - ii) Bevel gear
 - f) Explain PdV work in detail 03
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE, 03
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) Two pulleys having diameters 2m and 1.5 m are separated by a distance of 5 m. the initial tension in the belt is 3kN. The coefficient of friction between the belt and the pulley is 0.3. Calculate the power transmitted by the open belt, when the smaller pulley rotates at 200 rpm. 05
 - b) Describe Lathe Machine with its neat Sketch. 05
 - c) A cycle comprises three processes. The energy transfers in each are tabulated below. Complete the table. 04
- | Process | Q (KJ) | W (KJ) | ΔU (KJ) |
|---------|--------|--------|-----------------|
| 1-2 | +80 | +30 | --- |
| 2-3 | --- | -50 | +20 |
| 3-1 | +50 | --- | --- |
- d) Explain with neat sketch construction & working of Centrifugal Pump. 04
 - e) Derive an expression for length of belt for open belt drive. 04
 - f) Explain Oxy-Acetylene Gas welding in detail. 04

Section – II**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:07

Q.1 Choose the correct alternatives from the given options.**07**

- 8) Break down of PN junction occurs _____.
a) with forward bias
b) with reverse bias
c) because of manufacturing defect
d) None of these
- 9) The ripple factor decreases with _____.
a) Decrease in capacitance
b) Increase in frequency
c) Increase in capacitance
d) None of these
- 10) Transistor is operated as a closed switch in _____ region.
a) Saturation
b) Cut-off
c) Active region
d) None of these
- 11) In BJT, largest current flow occurs in the _____.
a) emitter
b) collector
c) base
d) All of these
- 12) The decimal number 17 is equal to binary number _____.
a) 10010
b) 11000
c) 10001
d) 01001
- 13) The output of an AND gate is high when _____.
a) Any input is high
b) All inputs are high
c) No inputs are high
d) Both (A) and (B)
- 14) The most suitable gate for comparing two bits is _____.
a) AND
b) OR
c) XOR
d) NAND

Seat No.	
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Set

P

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering #
(BTCE0105) / (BTCSE0105) / (BTETE0105) / (BTEE0105) / (BTME0105)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Solve any Four

16

- State and Explain Kirchhoff's current and voltage law with suitable diagram.
- Derive the expression for the division of current through three branches in parallel.
- State and explain Faraday's laws of electromagnetic induction.
- Derive the emf equation of single phase transformer.
- Derive expression for purely capacitive circuit. Draw phasor diagram.
- For series R-L-C circuit the supply voltage $V_s = 100$ V, Voltage across resistance is 80 V. voltage across inductance is 150 V. What is the voltage across capacitor and power factor of a circuit? Assume $V_L > V_C$.

Q.3 Solve any Two

12

- Derive the equation for converting star resistances into equivalent delta resistances.
- A single-phase transformer has 350 primaries and 1050 secondary turns. The net cross sectional area of the core is 50 cm^2 . If the primary winding is connected to a 50 Hz supply at 400 V, calculate:
 - The maximum value of the flux density in the core, and
 - The voltage induced in the secondary winding.
- Explain series R-L-C circuit for the condition $X_L > X_C$, with voltage triangle, impedance triangle and phasor diagram.

Section – II**Q.2 Solve any Four.****16**

- a) Draw circuit diagram and explain VI characteristics of PN junction diode.
- b) Explain Full wave center tap rectifier with necessary diagrams.
- c) Explain working of BJT as amplifier.
- d) Explain input and output characteristics of common base (CB) configuration of transistor.
- e) State and prove De-Morgan theorem.
- f) What is meant by universal gate? Derive basic gates using NAND and NOR gate.

Q.3 Solve any Two.**12**

- a) Explain working of capacitor filter using full wave rectifier with neat circuit diagram.
- b) Compare different transistor configurations on the basis of input resistance, output resistance, voltage gain and current gain.
- c) Covert
 - i) $(AB.CD)_H$ to binary,
 - ii) $(132)_8$ to decimal.

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering #
(BTCE0105) /(BTCSE0105)/ (BTETE0105)/ (BTEE0105)/ (BTME0105)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Solve any Four**16**

- State and Explain Kirchhoff's current and voltage law with suitable diagram.
- Derive the expression for the division of current through three branches in parallel.
- State and explain Faraday's laws of electromagnetic induction.
- Derive the emf equation of single phase transformer.
- Derive expression for purely capacitive circuit. Draw phasor diagram.
- For series R-L-C circuit the supply voltage $V_s = 100$ V, Voltage across resistance is 80 V. voltage across inductance is 150 V. What is the voltage across capacitor and power factor of a circuit? Assume $V_L > V_C$.

Q.3 Solve any Two**12**

- Derive the equation for converting star resistances into equivalent delta resistances.
- A single-phase transformer has 350 primaries and 1050 secondary turns. The net cross sectional area of the core is 50 cm^2 . If the primary winding is connected to a 50 Hz supply at 400 V, calculate:
 - The maximum value of the flux density in the core, and
 - The voltage induced in the secondary winding.
- Explain series R-L-C circuit for the condition $X_L > X_C$, with voltage triangle, impedance triangle and phasor diagram.

Section – II**Q.2 Solve any Four.****16**

- a) Draw circuit diagram and explain VI characteristics of PN junction diode.
- b) Explain Full wave center tap rectifier with necessary diagrams.
- c) Explain working of BJT as amplifier.
- d) Explain input and output characteristics of common base (CB) configuration of transistor.
- e) State and prove De-Morgan theorem.
- f) What is meant by universal gate? Derive basic gates using NAND and NOR gate.

Q.3 Solve any Two.**12**

- a) Explain working of capacitor filter using full wave rectifier with neat circuit diagram.
- b) Compare different transistor configurations on the basis of input resistance, output resistance, voltage gain and current gain.
- c) Covert
 - i) $(AB.CD)_H$ to binary,
 - ii) $(132)_8$ to decimal.

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering #
(BTCE0105) /(BTCSE0105)/ (BTETE0105)/ (BTEE0105)/ (BTME0105)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Solve any Four **16**

- a) State and Explain Kirchhoff's current and voltage law with suitable diagram.
- b) Derive the expression for the division of current through three branches in parallel.
- c) State and explain Faraday's laws of electromagnetic induction.
- d) Derive the emf equation of single phase transformer.
- e) Derive expression for purely capacitive circuit. Draw phasor diagram.
- f) For series R-L-C circuit the supply voltage $V_s = 100$ V, Voltage across resistance is 80 V. voltage across inductance is 150 V. What is the voltage across capacitor and power factor of a circuit? Assume $V_L > V_C$.

Q.3 Solve any Two **12**

- a) Derive the equation for converting star resistances into equivalent delta resistances.
- b) A single-phase transformer has 350 primaries and 1050 secondary turns. The net cross sectional area of the core is 50 cm^2 . If the primary winding is connected to a 50 Hz supply at 400 V, calculate:
 - i) The maximum value of the flux density in the core, and
 - ii) The voltage induced in the secondary winding.
- c) Explain series R-L-C circuit for the condition $X_L > X_C$, with voltage triangle, impedance triangle and phasor diagram.

Section – II**Q.2 Solve any Four.****16**

- a) Draw circuit diagram and explain VI characteristics of PN junction diode.
- b) Explain Full wave center tap rectifier with necessary diagrams.
- c) Explain working of BJT as amplifier.
- d) Explain input and output characteristics of common base (CB) configuration of transistor.
- e) State and prove De-Morgan theorem.
- f) What is meant by universal gate? Derive basic gates using NAND and NOR gate.

Q.3 Solve any Two.**12**

- a) Explain working of capacitor filter using full wave rectifier with neat circuit diagram.
- b) Compare different transistor configurations on the basis of input resistance, output resistance, voltage gain and current gain.
- c) Covert
 - i) $(AB.CD)_H$ to binary,
 - ii) $(132)_8$ to decimal.

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering #
(BTCE0105) /(BTCSE0105)/ (BTETE0105)/ (BTEE0105)/ (BTME0105)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

Section – I

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) Frequency of an a.c. quantity is defined as _____.
 a) number of cycles/sec
 b) time/cycles
 c) sec/revolution of magnetic energy
 d) cycle/revolution
- 2) According to KCL algebraic sum of currents meeting at junction is _____.
 a) Infinity
 b) Minimum
 c) Zero
 d) None of the above
- 3) A sinusoidal alternating current has a maximum value of I_m . Its average value will be _____.
 a) I_m/π
 b) $I_m/2\pi$
 c) $2I_m/\pi$
 d) None of these
- 4) A absolute permeability of magnetic material is _____.
 a) Φ/B
 b) B/H
 c) HB
 d) $1/\mu_0 \mu_r$
- 5) The SI unit of reluctance is _____.
 a) AT/M
 b) AT/Wb
 c) AT
 d) N/Wb
- 6) If alternating voltage is given by, $v = 230 \sin (376.99t)$, then the frequency is _____.
 a) 60Hz
 b) 50 Hz
 c) 40 Hz
 d) 200Hz
- 7) The form factor of sinusoidal quantity is _____.
 a) 1.11
 b) 1.57
 c) 1.414
 d) 0.637

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering #
(BTCE0105) / (BTCSE0105) / (BTETE0105) / (BTEE0105) / (BTME0105)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Solve any Four **16**

- a) State and Explain Kirchhoff's current and voltage law with suitable diagram.
- b) Derive the expression for the division of current through three branches in parallel.
- c) State and explain Faraday's laws of electromagnetic induction.
- d) Derive the emf equation of single phase transformer.
- e) Derive expression for purely capacitive circuit. Draw phasor diagram.
- f) For series R-L-C circuit the supply voltage $V_s = 100$ V, Voltage across resistance is 80 V. voltage across inductance is 150 V. What is the voltage across capacitor and power factor of a circuit? Assume $V_L > V_C$.

Q.3 Solve any Two **12**

- a) Derive the equation for converting star resistances into equivalent delta resistances.
- b) A single-phase transformer has 350 primaries and 1050 secondary turns. The net cross sectional area of the core is 50 cm^2 . If the primary winding is connected to a 50 Hz supply at 400 V, calculate:
 - i) The maximum value of the flux density in the core, and
 - ii) The voltage induced in the secondary winding.
- c) Explain series R-L-C circuit for the condition $X_L > X_C$, with voltage triangle, impedance triangle and phasor diagram.

Section – II**Q.2 Solve any Four.****16**

- a) Draw circuit diagram and explain VI characteristics of PN junction diode.
- b) Explain Full wave center tap rectifier with necessary diagrams.
- c) Explain working of BJT as amplifier.
- d) Explain input and output characteristics of common base (CB) configuration of transistor.
- e) State and prove De-Morgan theorem.
- f) What is meant by universal gate? Derive basic gates using NAND and NOR gate.

Q.3 Solve any Two.**12**

- a) Explain working of capacitor filter using full wave rectifier with neat circuit diagram.
- b) Compare different transistor configurations on the basis of input resistance, output resistance, voltage gain and current gain.
- c) Covert
 - i) $(AB.CD)_H$ to binary,
 - ii) $(132)_8$ to decimal.

Seat No.	
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Day & Date: Saturday, 25-05-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Marks: 14

14

- 1) In conductor, current flows due to _____.
a) electrons b) both- holes and electrons
c) protons d) holes
- 2) Donor type semiconductor is formed by adding impurity of valency _____.
a) 4 b) 5
c) 3 d) 6
- 3) The co-ordination number in case of FCC structure is _____.
a) 6 b) 8
c) 12 d) 10
- 4) The atomic radius of FCC lattice is _____.
a) $\frac{\sqrt{2}a}{4}$ b) $\frac{\sqrt{3}a}{4}$
c) $a/2$ d) $a/4$
- 5) The absorption coefficient is measured in _____.
a) WOU b) OWU
c) m/s d) UOW
- 6) The ultrasonic wave exhibit _____.
a) Negligible diffraction effect b) Large diffraction effect
c) Very long wavelength d) Slow speed than sound waves
- 7) The length of the rod moving wit velocity v relative to the observer is same when _____.
a) $v = 0$ b) v is comparable to c
c) $v \geq c$ d) $v \ll c$

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
ENGINEERING PHYSICS (BTN10101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any SIX of the following

18

- a) Explain with diagrams, the position of Fermi level in
 - i) P-type, and
 - ii) N-type semiconductors
- b) Classify conductor, insulator and semiconductor on the basis of energy band structure.
- c) Define atomic radius and obtain its values for SC and BCC crystals.
- d) State the properties of ultrasonic waves.
- e) Derive the expression $E = mc^2$
- f) Derive an expression for Time dilation.
- g) Determine the lattice constant (a) FCC lead crystal of radius 1.746 \AA . Also find the spacing of
 - i) (200) planes and
 - ii) (111) planes
- h) An auditorium of volume 6525 m^3 has reverberation time 2.1 sec. If the total absorbing material (surface) area in the hall is 4980 m^2 . Calculate the coefficient of absorption.

Q.3 Attempt any TWO of the following:

10

- a) Explain the term Miller indices. Derive the relation between lattice constant & interplanar spacing for cubic crystal.
- b) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- c) State and explain the factors affecting the architectural acoustics and their remedies.
- d)
 - i) At what speed the mass of an object will be double of its value at rest.
 - ii) What is speed of clock to keep correct time w.r.t observer, so that it may seem to lose 1 min per day.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Define:
 - i) Spontaneous emission
 - ii) Stimulated emission, and
 - iii) Stimulated absorption
- c) Explain: Construction and reconstruction of hologram with neat diagram.
- d) Write a note on: Classification of optical fibers.
- e) State: Properties of matter waves.
- f) Write applications of nanotechnology.
- g) A grating has 100 lines ruled on it. What is the difference between two wavelengths that just appear separated in the second order spectrum in the region $\lambda = 6 \times 10^{-5}$ cm.
- h) What is the numerical aperture and fractional refractive index change of an optical fiber cable with cladding index of 1.378 and a core index of 1.546.

Q.5 Attempt any TWO of the following:**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h = 6.634 \times 10^{-34}$ J.s and $m = 1.67 \times 10^{-27}$ kg.

**Seat
No.**

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Set **Q**

F.Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
ENGINEERING PHYSICS (BTN10101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any SIX of the following

18

- a) Explain with diagrams, the position of Fermi level in
 - i) P-type, and
 - ii) N-type semiconductors
- b) Classify conductor, insulator and semiconductor on the basis of energy band structure.
- c) Define atomic radius and obtain its values for SC and BCC crystals.
- d) State the properties of ultrasonic waves.
- e) Derive the expression $E = mc^2$
- f) Derive an expression for Time dilation.
- g) Determine the lattice constant (a) FCC lead crystal of radius 1.746 \AA . Also find the spacing of
 - i) (200) planes and
 - ii) (111) planes
- h) An auditorium of volume 6525 m^3 has reverberation time 2.1 sec. If the total absorbing material (surface) area in the hall is 4980 m^2 . Calculate the coefficient of absorption.

Q.3 Attempt any TWO of the following:

10

- a) Explain the term Miller indices. Derive the relation between lattice constant & interplanar spacing for cubic crystal.
- b) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- c) State and explain the factors affecting the architectural acoustics and their remedies.
- d)
 - i) At what speed the mass of an object will be double of its value at rest.
 - ii) What is speed of clock to keep correct time w.r.t observer, so that it may seem to lose 1 min per day.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Define:
 - i) Spontaneous emission
 - ii) Stimulated emission, and
 - iii) Stimulated absorption
- c) Explain: Construction and reconstruction of hologram with neat diagram.
- d) Write a note on: Classification of optical fibers.
- e) State: Properties of matter waves.
- f) Write applications of nanotechnology.
- g) A grating has 100 lines ruled on it. What is the difference between two wavelengths that just appear separated in the second order spectrum in the region $\lambda = 6 \times 10^{-5}$ cm.
- h) What is the numerical aperture and fractional refractive index change of an optical fiber cable with cladding index of 1.378 and a core index of 1.546.

Q.5 Attempt any TWO of the following:**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h = 6.634 \times 10^{-34}$ J.s and $m = 1.67 \times 10^{-27}$ kg.

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
ENGINEERING PHYSICS (BTN10101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if necessary.

- Constants:** 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The hologram records _____ of the object.
 - a) Both intensity variation and phase distribution
 - b) Only phase distribution
 - c) Only intensity variation
 - d) None of these
- 2) In total internal reflection phenomenon, the light ray incident from _____.
 - a) Rarer to denser
 - b) Rarer to rarer
 - c) Denser to denser
 - d) Denser to rarer
- 3) The numerical aperture is given by the equation _____.
 - a) $NA = \sqrt{n_1^2 + n_2^2}$
 - b) $NA = n_1^2 - n_2^2$
 - c) $NA = \sqrt{n_1^2 - n_2^2}$
 - d) $NA = \sqrt{n_2^2 + n_1^2}$
- 4) The chirality of zigzag CNT is _____.
 - a) (a, b)
 - b) $(a, 0)$
 - c) (a, a)
 - d) $(0, b)$
- 5) In conductor, current flows due to _____.
 - a) electrons
 - b) both- holes and electrons
 - c) protons
 - d) holes
- 6) Donor type semiconductor is formed by adding impurity of valency _____.
 - a) 4
 - b) 5
 - c) 3
 - d) 6
- 7) The co-ordination number in case of FCC structure is _____.
 - a) 6
 - b) 8
 - c) 12
 - d) 10

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
ENGINEERING PHYSICS (BTN10101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any SIX of the following

18

- a) Explain with diagrams, the position of Fermi level in
 - i) P-type, and
 - ii) N-type semiconductors
- b) Classify conductor, insulator and semiconductor on the basis of energy band structure.
- c) Define atomic radius and obtain its values for SC and BCC crystals.
- d) State the properties of ultrasonic waves.
- e) Derive the expression $E = mc^2$
- f) Derive an expression for Time dilation.
- g) Determine the lattice constant (a) FCC lead crystal of radius 1.746 \AA . Also find the spacing of
 - i) (200) planes and
 - ii) (111) planes
- h) An auditorium of volume 6525 m^3 has reverberation time 2.1 sec. If the total absorbing material (surface) area in the hall is 4980 m^2 . Calculate the coefficient of absorption.

Q.3 Attempt any TWO of the following:

10

- a) Explain the term Miller indices. Derive the relation between lattice constant & interplanar spacing for cubic crystal.
- b) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- c) State and explain the factors affecting the architectural acoustics and their remedies.
- d)
 - i) At what speed the mass of an object will be double of its value at rest.
 - ii) What is speed of clock to keep correct time w.r.t observer, so that it may seem to lose 1 min per day.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Define:
 - i) Spontaneous emission
 - ii) Stimulated emission, and
 - iii) Stimulated absorption
- c) Explain: Construction and reconstruction of hologram with neat diagram.
- d) Write a note on: Classification of optical fibers.
- e) State: Properties of matter waves.
- f) Write applications of nanotechnology.
- g) A grating has 100 lines ruled on it. What is the difference between two wavelengths that just appear separated in the second order spectrum in the region $\lambda = 6 \times 10^{-5}$ cm.
- h) What is the numerical aperture and fractional refractive index change of an optical fiber cable with cladding index of 1.378 and a core index of 1.546.

Q.5 Attempt any TWO of the following:**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h = 6.634 \times 10^{-34}$ J.s and $m = 1.67 \times 10^{-27}$ kg.

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
ENGINEERING PHYSICS (BTN10101)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if necessary.

- Constants:** 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The ultrasonic wave exhibit _____.
 a) Negligible diffraction effect b) Large diffraction effect
 c) Very long wavelength d) Slow speed than sound waves
- 2) The length of the rod moving with velocity v relative to the observer is same when _____.
 a) $v = 0$ b) v is comparable to c
 c) $v \geq c$ d) $v \ll c$
- 3) The resolving power of a grating having N slits in n^{th} order will be _____.
 a) $(n + N)$ b) $(n - N)$
 c) n/N d) $n \cdot N$
- 4) The substances that rotate the plane of polarization are said to be _____.
 a) opaque b) optically inactive
 c) optically active d) Polaroid
- 5) Stimulated emission process is represented by equation _____.
 a) $A + h\nu \rightarrow A^*$ b) $A^* + h\nu \rightarrow A + 2h\nu$
 c) $A^* \rightarrow A + h\nu$ d) $A^* + h\nu \rightarrow A + h\nu$
- 6) The hologram records _____ of the object.
 a) Both intensity variation and phase distribution
 b) Only phase distribution
 c) Only intensity variation
 d) None of these
- 7) In total internal reflection phenomenon, the light ray incident from _____.
 a) Rarer to denser b) Rarer to rarer
 c) Denser to denser d) Denser to rarer

- 8) The numerical aperture is given by the equation _____.
a) $NA = \sqrt{n_1^2 + n_2^2}$ b) $NA = n_1^2 - n_2^2$
c) $NA = \sqrt{n_1^2 - n_2^2}$ d) $NA = \sqrt{n_2^2 + n_1^2}$
- 9) The chirality of zigzag CNT is _____.
a) (a, b) b) $(a, 0)$
c) (a, a) d) $(0, b)$
- 10) In conductor, current flows due to _____.
a) electrons b) both- holes and electrons
c) protons d) holes
- 11) Donor type semiconductor is formed by adding impurity of valency _____.
a) 4 b) 5
c) 3 d) 6
- 12) The co-ordination number in case of FCC structure is _____.
a) 6 b) 8
c) 12 d) 10
- 13) The atomic radius of FCC lattice is _____.
a) $\frac{\sqrt{2}a}{4}$ b) $\frac{\sqrt{3}a}{4}$
c) $a/2$ d) $a/4$
- 14) The absorption coefficient is measured in _____.
a) WOU b) OWU
c) m/s d) UOW

Seat No.	
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Set **S**

**F.Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
ENGINEERING PHYSICS (BTN10101)**

Day & Date: Saturday, 25-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any SIX of the following

18

- a) Explain with diagrams, the position of Fermi level in
 - i) P-type, and
 - ii) N-type semiconductors
- b) Classify conductor, insulator and semiconductor on the basis of energy band structure.
- c) Define atomic radius and obtain its values for SC and BCC crystals.
- d) State the properties of ultrasonic waves.
- e) Derive the expression $E = mc^2$
- f) Derive an expression for Time dilation.
- g) Determine the lattice constant (a) FCC lead crystal of radius 1.746 \AA . Also find the spacing of
 - i) (200) planes and
 - ii) (111) planes
- h) An auditorium of volume 6525 m^3 has reverberation time 2.1 sec. If the total absorbing material (surface) area in the hall is 4980 m^2 . Calculate the coefficient of absorption.

Q.3 Attempt any TWO of the following:

10

- a) Explain the term Miller indices. Derive the relation between lattice constant & interplanar spacing for cubic crystal.
- b) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- c) State and explain the factors affecting the architectural acoustics and their remedies.
- d)
 - i) At what speed the mass of an object will be double of its value at rest.
 - ii) What is speed of clock to keep correct time w.r.t observer, so that it may seem to lose 1 min per day.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Define:
 - i) Spontaneous emission
 - ii) Stimulated emission, and
 - iii) Stimulated absorption
- c) Explain: Construction and reconstruction of hologram with neat diagram.
- d) Write a note on: Classification of optical fibers.
- e) State: Properties of matter waves.
- f) Write applications of nanotechnology.
- g) A grating has 100 lines ruled on it. What is the difference between two wavelengths that just appear separated in the second order spectrum in the region $\lambda = 6 \times 10^{-5}$ cm.
- h) What is the numerical aperture and fractional refractive index change of an optical fiber cable with cladding index of 1.378 and a core index of 1.546.

Q.5 Attempt any TWO of the following:**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.30 nm. Given $h = 6.634 \times 10^{-34}$ J.s and $m = 1.67 \times 10^{-27}$ kg.

Seat No.	
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F.Y. (B. Tech) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10102)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Water matching distilled water is obtained by using:

a) Zeolite process	b) Ion exchange process
c) lime soda process	d) Boiling
- 2) In the determination of dissolved oxygen by Winkler's method, _____ is used as oxygen carrier.

a) KI	b) $\text{Na}_2\text{S}_2\text{O}_3$
c) $\text{Mn}(\text{OH})_2$	d) KOH
- 3) A lubricant is used primarily to prevent:

a) corrosion of metals	b) oxidation of metals
c) reduction of metals	d) wearing out of rubbing metallic surfaces
- 4) The favorable lubrication in delicate instruments is _____.

a) Thick film	b) Thin film
c) Extreme pressure	d) Boundary
- 5) In electrochemical corrosion _____.

a) anode undergoes oxidation	b) cathode undergoes oxidation
c) both undergoes oxidation	d) none of the above
- 6) The process of zinc coating over iron sheet by hot dipping is called _____.

a) Galvanizing	b) Tinning
c) Sheradizing	d) Anodizing
- 7) Carbon in cast iron:

a) increases its hardness	b) decreases its hardness
c) imparts softness	d) decreases fluidity
- 8) The main constituent of glass is:

a) CaO	b) SiO_2
c) Al_2O_3	d) boron

- 9) An example of primary fuel is:

 - a) natural gas
 - b) petrol
 - c) wood charcoal
 - d) coke
- 10) Calorific value of a solid fuel or non-volatile liquid fuel is found with the help of ____.

 - a) Junkers calorimeter
 - b) Bomb calorimeter
 - c) Boys calorimeter
 - d) Orsat apparatus
- 11) The process of vulcanization makes rubber:

 - a) soluble in water
 - b) hard
 - c) soft
 - d) more elastic
- 12) Molecular mass of a polymer is:

 - a) small
 - b) very small
 - c) large
 - d) negligible
- 13) Number of moles of solute present in 1 Kg of solvent is called:

 - a) Normality
 - b) Molarity
 - c) Molality
 - d) Mole fraction
- 14) Which is the electrolyte used in Li-ion battery?

 - a) Lead dioxide
 - b) Lithium-based gel
 - c) Sulfur dioxide
 - d) Cobalt

Seat No.	
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Set **P**

F.Y. (B. Tech) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10102)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	30.15	162
Mg(HCO ₃) ₂	38.73	146
CaSO ₄	24.10	136
MgCl ₂	13.90	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain principle of Li-ion batteries.
 d) Explain semisolid lubricants.
 e) Explain Hydrogen evolution mechanism and oxygen absorption mechanism in electrochemical corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four:

12

- a) Define disinfection. Explain disinfection of water by Chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Select proper lubricants for
 i) Cutting tools
 ii) Transformers
 iii) I. C. Engine
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 2.8 ml of N/10 KOH solution calculate its acid value.
 e) Define lubrication. Explain mechanism of thick film lubrication.
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:**16**

- a) Define alloy. Explain purpose of alloying.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2.5% and ash = 3.4%. (Take latent heat of steam = 587 cal/g)
- c) Explain construction and working of Boy's calorimeter.
- d) Explain molding of plastics in to articles by following methods:
 - i) Injection molding
 - ii) Extrusion molding
- e) Explain properties and applications of PVC and BUNA-S rubber.
- f) Define TGA. Explain instrumentation of TGA. What are its applications.

Q.5 Attempt any Four:**12**

- a) Explain composition, properties and applications of steel.
- b) Define fuel. Explain classification of fuels.
- c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
- d) Define Chromatography. Explain its classification.
- e) Calculate molecular weight of polyvinyl chloride having degree of polymerization 350. (Mol. Wt. of vinyl chloride = 62.5)
- f) Calculate weight of AgNO_3 required to prepare 0.2 M 100 ml solution. (Mol. Wt. of AgNO_3 = 170)

Seat No.	
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Set **Q**

F.Y. (B. Tech) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10102)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The main constituent of glass is:

a) CaO	b) SiO ₂
c) Al ₂ O ₃	d) boron
- 2) An example of primary fuel is:

a) natural gas	b) petrol
c) wood charcoal	d) coke
- 3) Calorific value of a solid fuel or non-volatile liquid fuel is found with the help of _____.

a) Junkers calorimeter	b) Bomb calorimeter
c) Boys calorimeter	d) Orsat apparatus
- 4) The process of vulcanization makes rubber:

a) soluble in water	b) hard
c) soft	d) more elastic
- 5) Molecular mass of a polymer is:

a) small	b) very small
c) large	d) negligible
- 6) Number of moles of solute present in 1 Kg of solvent is called:

a) Normality	b) Molarity
c) Molality	d) Mole fraction
- 7) Which is the electrolyte used in Li-ion battery?

a) Lead dioxide	b) Lithium-based gel
c) Sulfur dioxide	d) Cobalt
- 8) Water matching distilled water is obtained by using:

a) Zeolite process	b) Ion exchange process
c) lime soda process	d) Boiling
- 9) In the determination of dissolved oxygen by Winkler's method, _____ is used as oxygen carrier.

a) KI	b) Na ₂ S ₂ O ₃
c) Mn(OH) ₂	d) KOH

- 10) A lubricant is used primarily to prevent:
 - a) corrosion of metals
 - b) oxidation of metals
 - c) reduction of metals
 - d) wearing out of rubbing metallic surfaces
- 11) The favorable lubrication in delicate instruments is _____.
 - a) Thick film
 - b) Thin film
 - c) Extreme pressure
 - d) Boundary
- 12) In electrochemical corrosion _____.
 - a) anode undergoes oxidation
 - b) cathode undergoes oxidation
 - c) both undergoes oxidation
 - d) none of the above
- 13) The process of zinc coating over iron sheet by hot dipping is called _____.
 - a) Galvanizing
 - b) Tinning
 - c) Sheradizing
 - d) Anodizing
- 14) Carbon in cast iron:
 - a) increases its hardness
 - b) decreases its hardness
 - c) imparts softness
 - d) decreases fluidity

Seat No.	
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Set

Q

F.Y. (B. Tech) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10102)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	30.15	162
Mg(HCO ₃) ₂	38.73	146
CaSO ₄	24.10	136
MgCl ₂	13.90	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain principle of Li-ion batteries.
 d) Explain semisolid lubricants.
 e) Explain Hydrogen evolution mechanism and oxygen absorption mechanism in electrochemical corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four:

12

- a) Define disinfection. Explain disinfection of water by Chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Select proper lubricants for
 i) Cutting tools
 ii) Transformers
 iii) I. C. Engine
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 2.8 ml of N/10 KOH solution calculate its acid value.
 e) Define lubrication. Explain mechanism of thick film lubrication.
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:**16**

- a) Define alloy. Explain purpose of alloying.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2.5% and ash = 3.4%. (Take latent heat of steam = 587 cal/g)
- c) Explain construction and working of Boy's calorimeter.
- d) Explain molding of plastics in to articles by following methods:
 - i) Injection molding
 - ii) Extrusion molding
- e) Explain properties and applications of PVC and BUNA-S rubber.
- f) Define TGA. Explain instrumentation of TGA. What are its applications.

Q.5 Attempt any Four:**12**

- a) Explain composition, properties and applications of steel.
- b) Define fuel. Explain classification of fuels.
- c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
- d) Define Chromatography. Explain its classification.
- e) Calculate molecular weight of polyvinyl chloride having degree of polymerization 350. (Mol. Wt. of vinyl chloride = 62.5)
- f) Calculate weight of AgNO_3 required to prepare 0.2 M 100 ml solution. (Mol. Wt. of AgNO_3 = 170)

Seat No.	
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Set **R**

F.Y. (B. Tech) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10102)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The process of vulcanization makes rubber:
 - a) soluble in water
 - b) hard
 - c) soft
 - d) more elastic
- 2) Molecular mass of a polymer is:
 - a) small
 - b) very small
 - c) large
 - d) negligible
- 3) Number of moles of solute present in 1 Kg of solvent is called:
 - a) Normality
 - b) Molarity
 - c) Molality
 - d) Mole fraction
- 4) Which is the electrolyte used in Li-ion battery?
 - a) Lead dioxide
 - b) Lithium-based gel
 - c) Sulfur dioxide
 - d) Cobalt
- 5) Water matching distilled water is obtained by using:
 - a) Zeolite process
 - b) Ion exchange process
 - c) lime soda process
 - d) Boiling
- 6) In the determination of dissolved oxygen by Winkler's method, _____ is used as oxygen carrier.
 - a) KI
 - b) $\text{Na}_2\text{S}_2\text{O}_3$
 - c) $\text{Mn}(\text{OH})_2$
 - d) KOH
- 7) A lubricant is used primarily to prevent:
 - a) corrosion of metals
 - b) oxidation of metals
 - c) reduction of metals
 - d) wearing out of rubbing metallic surfaces
- 8) The favorable lubrication in delicate instruments is _____.
 - a) Thick film
 - b) Thin film
 - c) Extreme pressure
 - d) Boundary

- 9) In electrochemical corrosion _____.
a) anode undergoes oxidation b) cathode undergoes oxidation
c) both undergoes oxidation d) none of the above
- 10) The process of zinc coating over iron sheet by hot dipping is called _____.
a) Galvanizing b) Tinning
c) Sheradizing d) Anodizing
- 11) Carbon in cast iron:
a) increases its hardness b) decreases its hardness
c) imparts softness d) decreases fluidity
- 12) The main constituent of glass is:
a) CaO b) SiO₂
c) Al₂O₃ d) boron
- 13) An example of primary fuel is:
a) natural gas b) petrol
c) wood charcoal d) coke
- 14) Calorific value of a solid fuel or non-volatile liquid fuel is found with the help of _____.
a) Junkers calorimeter b) Bomb calorimeter
c) Boys calorimeter d) Orsat apparatus

Seat No.	
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Set

R

F.Y. (B. Tech) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10102)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four: **16**

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	30.15	162
Mg(HCO ₃) ₂	38.73	146
CaSO ₄	24.10	136
MgCl ₂	13.90	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain principle of Li-ion batteries.
 d) Explain semisolid lubricants.
 e) Explain Hydrogen evolution mechanism and oxygen absorption mechanism in electrochemical corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four: **12**

- a) Define disinfection. Explain disinfection of water by Chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Select proper lubricants for
 i) Cutting tools
 ii) Transformers
 iii) I. C. Engine
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 2.8 ml of N/10 KOH solution calculate its acid value.
 e) Define lubrication. Explain mechanism of thick film lubrication.
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:**16**

- a) Define alloy. Explain purpose of alloying.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2.5% and ash = 3.4%. (Take latent heat of steam = 587 cal/g)
- c) Explain construction and working of Boy's calorimeter.
- d) Explain molding of plastics in to articles by following methods:
 - i) Injection molding
 - ii) Extrusion molding
- e) Explain properties and applications of PVC and BUNA-S rubber.
- f) Define TGA. Explain instrumentation of TGA. What are its applications.

Q.5 Attempt any Four:**12**

- a) Explain composition, properties and applications of steel.
- b) Define fuel. Explain classification of fuels.
- c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
- d) Define Chromatography. Explain its classification.
- e) Calculate molecular weight of polyvinyl chloride having degree of polymerization 350. (Mol. Wt. of vinyl chloride = 62.5)
- f) Calculate weight of AgNO_3 required to prepare 0.2 M 100 ml solution. (Mol. Wt. of AgNO_3 = 170)

Seat No.	
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Day & Date: Monday, 27-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.

- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Draw neat and labeled diagrams wherever necessary.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The process of zinc coating over iron sheet by hot dipping is called _____.
a) Galvanizing
b) Tinning
c) Sheradizing
d) Anodizing
- 2) Carbon in cast iron:
a) increases its hardness
b) decreases its hardness
c) imparts softness
d) decreases fluidity
- 3) The main constituent of glass is:
a) CaO
b) SiO₂
c) Al₂O₃
d) boron
- 4) An example of primary fuel is:
a) natural gas
b) petrol
c) wood charcoal
d) coke
- 5) Calorific value of a solid fuel or non-volatile liquid fuel is found with the help of _____.
a) Junkers calorimeter
b) Bomb calorimeter
c) Boys calorimeter
d) Orsat apparatus
- 6) The process of vulcanization makes rubber:
a) soluble in water
b) hard
c) soft
d) more elastic
- 7) Molecular mass of a polymer is:
a) small
b) very small
c) large
d) negligible
- 8) Number of moles of solute present in 1 Kg of solvent is called:
a) Normality
b) Molarity
c) Molality
d) Mole fraction
- 9) Which is the electrolyte used in Li-ion battery?
a) Lead dioxide
b) Lithium-based gel
c) Sulfur dioxide
d) Cobalt

- 10)** Water matching distilled water is obtained by using:
- a) Zeolite process
 - b) Ion exchange process
 - c) lime soda process
 - d) Boiling
- 11)** In the determination of dissolved oxygen by Winkler's method, _____ is used as oxygen carrier.
- a) KI
 - b) $\text{Na}_2\text{S}_2\text{O}_3$
 - c) $\text{Mn}(\text{OH})_2$
 - d) KOH
- 12)** A lubricant is used primarily to prevent:
- a) corrosion of metals
 - b) oxidation of metals
 - c) reduction of metals
 - d) wearing out of rubbing metallic surfaces
- 13)** The favorable lubrication in delicate instruments is _____.
- a) Thick film
 - b) Thin film
 - c) Extreme pressure
 - d) Boundary
- 14)** In electrochemical corrosion _____.
- a) anode undergoes oxidation
 - b) cathode undergoes oxidation
 - c) both undergoes oxidation
 - d) none of the above

Seat No.	
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Set **S**

F.Y. (B. Tech) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10102)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four: **16**

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	30.15	162
Mg(HCO ₃) ₂	38.73	146
CaSO ₄	24.10	136
MgCl ₂	13.90	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain principle of Li-ion batteries.
 d) Explain semisolid lubricants.
 e) Explain Hydrogen evolution mechanism and oxygen absorption mechanism in electrochemical corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four: **12**

- a) Define disinfection. Explain disinfection of water by Chloramine.
 b) Define is COD. Explain determination of COD. Explain is its significance.
 c) Select proper lubricants for
 i) Cutting tools
 ii) Transformers
 iii) I. C. Engine
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 2.8 ml of N/10 KOH solution calculate its acid value.
 e) Define lubrication. Explain mechanism of thick film lubrication.
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:**16**

- a) Define alloy. Explain purpose of alloying.
- b) Calculate gross and net calorific value of a coal sample of coal having C = 83%, H = 7%, O = 2%, S = 1.5%, N = 2.5% and ash = 3.4%. (Take latent heat of steam = 587 cal/g)
- c) Explain construction and working of Boy's calorimeter.
- d) Explain molding of plastics in to articles by following methods:
 - i) Injection molding
 - ii) Extrusion molding
- e) Explain properties and applications of PVC and BUNA-S rubber.
- f) Define TGA. Explain instrumentation of TGA. What are its applications.

Q.5 Attempt any Four:**12**

- a) Explain composition, properties and applications of steel.
- b) Define fuel. Explain classification of fuels.
- c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
- d) Define Chromatography. Explain its classification.
- e) Calculate molecular weight of polyvinyl chloride having degree of polymerization 350. (Mol. Wt. of vinyl chloride = 62.5)
- f) Calculate weight of AgNO_3 required to prepare 0.2 M 100 ml solution. (Mol. Wt. of AgNO_3 = 170)

Max. Marks: 70

Section - I

Marks:07

07

Section - II**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:07

Q.1 Choose the correct alternatives from the options and rewrite the sentence. 07

- 1) The pump transfers the mechanical energy of a motor or of an engine into _____ of a fluid.
 - a) Pressure energy
 - b) kinetic energy
 - c) Either pressure energy or kinetic energy
 - d) pressure energy, kinetic energy or both
- 2) In which of the following welding process, electrodes get consumed _____.
 - a) TIG welding
 - b) Resistance welding
 - c) Thermit welding
 - d) Arc welding
- 3) The part of carriage which guides along guide ways of lathe bed is called _____.
 - a) Apron
 - b) Tool post
 - c) saddle
 - d) Cross slide
- 4) The process of removing material from the face of work piece is called _____.
 - a) Facing
 - b) Chamfering
 - c) Knurling
 - d) None of these
- 5) Method of joining two work pieces made of dissimilar material by heating above 450° C and below melting point is called _____.
 - a) Welding
 - b) Brazing
 - c) Soldering
 - d) None of these
- 6) Which of the following is an intensive property of a thermodynamic system?
 - a) Volume
 - b) Temperature
 - c) Mass
 - d) Energy
- 7) Internal energy is defined by _____.
 - a) Zeroth law of thermodynamics
 - b) First law of thermodynamics
 - c) Second law of thermodynamics
 - d) Law of entropy

Seat No.	
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Set **P**

F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering (BTN10104)

Day & Date: Wednesday, 15-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Q. 2 & Q. 4 are short answer type questions.
 2) Q. 3 and Q. 5 are long answer type questions.
 3) Neat diagram must be drawn whenever necessary.
 4) Figures to the right indicates full marks.
 5) Assume additional suitable data if necessary and state it clearly.
 6) Use of log tables and non-programmable single memory calculator is allowed.

Section – I

- Q.2 Attempt any five of the following questions. 15**
- What are the sub branches of civil engineering? Explain any one in short.
 - Explain the various sources of water in detail.
 - Draw the cross section of concrete dam and show various levels.
 - Differentiate between shallow foundation and deep foundation with suitable examples.
 - Explain the Indore method of composting.
 - Write any three applications of GIS.
 - What are the objectives of carrying out surveying?
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- Draw a neat sketch of road structure in cutting. **05**
 - Explain Effluent Treatment plant. **05**
 - With neat sketch explain any two types of shallow foundation. **04**
 - Write note on Principle of surveying. **04**
 - Write the difference between GIS and GPS. **04**
 - What is bridge? Write the classification of Bridges. **04**

- Instructions:** 1) Use of scientific calculator is allowed.
2) Figures to the right indicates full marks.
3) Assume additional suitable data if necessary and state it clearly.
4) Use university graph paper & semi-log paper if required.

Section – II

Q.2 Attempt any three. 12

- a) Explain construction and working of Reciprocating Pump with neat sketch.
- b) Explain Pelton Turbine with neat sketch.
- c) Explain metal arc welding with neat sketch.
- d) Explain basic elements of Drilling machine.

Q.3 Attempt any two. 10

- a) Derive an equation to calculate length of Open Belt Drive.
- b) Describe steady flow energy equation.
- c) Explain oxy acetylene welding.

Q.4 Attempt any one. 06

- a) A cycle consists of three processes. The energy transfer in each process is tabulated below Complete the table & determines the network of cycle.

Process	Q (kw)	W(Kw)	$\Delta U(Kw)$
1-2	50	-	20
2-3	-30	-40	-
3-1	-	-	-30

- b) Describe Lathe Machine with its block diagram

Seat No.	
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Max. Marks: 70

4) Assume additional suitable data if necessary and state it clearly.

Marks:07

d) All of the above

Seat No.	
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Set	Q
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**F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering (BTN10104)**

Day & Date: Wednesday, 15-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Q. 2 & Q. 4 are short answer type questions.
2) Q. 3 and Q. 5 are long answer type questions.
3) Neat diagram must be drawn whenever necessary.
4) Figures to the right indicates full marks.
5) Assume additional suitable data if necessary and state it clearly.
6) Use of log tables and non-programmable single memory calculator is allowed.

Section – I

- Q.2 Attempt any five of the following questions. 15**
- What are the sub branches of civil engineering? Explain any one in short.
 - Explain the various sources of water in detail.
 - Draw the cross section of concrete dam and show various levels.
 - Differentiate between shallow foundation and deep foundation with suitable examples.
 - Explain the Indore method of composting.
 - Write any three applications of GIS.
 - What are the objectives of carrying out surveying?
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- Draw a neat sketch of road structure in cutting. **05**
 - Explain Effluent Treatment plant. **05**
 - With neat sketch explain any two types of shallow foundation. **04**
 - Write note on Principle of surveying. **04**
 - Write the difference between GIS and GPS. **04**
 - What is bridge? Write the classification of Bridges. **04**

- Instructions:** 1) Use of scientific calculator is allowed.
2) Figures to the right indicates full marks.
3) Assume additional suitable data if necessary and state it clearly.
4) Use university graph paper & semi-log paper if required.

Section – II

Q.2 Attempt any three. 12

- a) Explain construction and working of Reciprocating Pump with neat sketch.
- b) Explain Pelton Turbine with neat sketch.
- c) Explain metal arc welding with neat sketch.
- d) Explain basic elements of Drilling machine.

Q.3 Attempt any two. 10

- a) Derive an equation to calculate length of Open Belt Drive.
- b) Describe steady flow energy equation.
- c) Explain oxy acetylene welding.

Q.4 Attempt any one. 06

- a) A cycle consists of three processes. The energy transfer in each process is tabulated below Complete the table & determines the network of cycle.

Process	Q (kw)	W(Kw)	$\Delta U(Kw)$
1-2	50	-	20
2-3	-30	-40	-
3-1	-	-	-30

- b) Describe Lathe Machine with its block diagram

Seat No.	
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Day & Date: Wednesday, 15-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- ## Section - I

Duration: 30 Minutes

Marks:07

Q.1 Choose the correct alternative from the options and rewrite the sentence. 07

- 1) Substructure consists of _____.
 - a) Foundation
 - b) Window
 - c) Parapet
 - d) All above
- 2) Salient features of a green building are _____.
 - a) Minimal disturbance to landscapes and site condition
 - b) Use of recycled and environmental friendly building materials
 - c) Use of non-toxic and recycled / recyclable materials / energy efficient and co-friendly equipment
 - d) All of the above
- 3) Hardware, software, data and people, these are components of _____.
 - a) GPS
 - b) RS
 - c) GIS
 - d) Total station
- 4) Rain water harvesting is required for _____.
 - a) Ground water table recharge
 - b) Bore-well recharge
 - c) Storage for future use
 - d) All the above
- 5) When two or more footings are connected by a beam then it is called as _____.
 - a) Beam footing
 - b) Combined footing
 - c) Strap footing
 - d) Mat footing
- 6) The reduced level of finished surface of earth is known as _____.
 - a) Formation Level
 - b) Kerb
 - c) Right of Way
 - d) Side drain
- 7) Construction of transmission towers is the relevance of Civil engineering with _____.
 - a) Computer Engineering
 - b) Mechanical Engineering
 - c) IT Engineering
 - d) Electrical Engineering

Seat No.	
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Set **R**

F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering (BTN10104)

Day & Date: Wednesday, 15-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Q. 2 & Q. 4 are short answer type questions.
 2) Q. 3 and Q. 5 are long answer type questions.
 3) Neat diagram must be drawn whenever necessary.
 4) Figures to the right indicates full marks.
 5) Assume additional suitable data if necessary and state it clearly.
 6) Use of log tables and non-programmable single memory calculator is allowed.

Section – I

- Q.2 Attempt any five of the following questions. 15**
- What are the sub branches of civil engineering? Explain any one in short.
 - Explain the various sources of water in detail.
 - Draw the cross section of concrete dam and show various levels.
 - Differentiate between shallow foundation and deep foundation with suitable examples.
 - Explain the Indore method of composting.
 - Write any three applications of GIS.
 - What are the objectives of carrying out surveying?
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- Draw a neat sketch of road structure in cutting. **05**
 - Explain Effluent Treatment plant. **05**
 - With neat sketch explain any two types of shallow foundation. **04**
 - Write note on Principle of surveying. **04**
 - Write the difference between GIS and GPS. **04**
 - What is bridge? Write the classification of Bridges. **04**

- Instructions:** 1) Use of scientific calculator is allowed.
2) Figures to the right indicates full marks.
3) Assume additional suitable data if necessary and state it clearly.
4) Use university graph paper & semi-log paper if required.

Section – II

Q.2 Attempt any three. 12

- a) Explain construction and working of Reciprocating Pump with neat sketch.
- b) Explain Pelton Turbine with neat sketch.
- c) Explain metal arc welding with neat sketch.
- d) Explain basic elements of Drilling machine.

Q.3 Attempt any two. 10

- a) Derive an equation to calculate length of Open Belt Drive.
- b) Describe steady flow energy equation.
- c) Explain oxy acetylene welding.

Q.4 Attempt any one. 06

- a) A cycle consists of three processes. The energy transfer in each process is tabulated below Complete the table & determines the network of cycle.

Process	Q (kw)	W(Kw)	$\Delta U(Kw)$
1-2	50	-	20
2-3	-30	-40	-
3-1	-	-	-30

- b) Describe Lathe Machine with its block diagram

Max. Marks: 70

Section - I

Marks:07

- 1) When two or more footings are connected by a beam then it is called as _____.
a) Beam footing b) Combined footing
c) Strap footing d) Mat footing
- 2) The reduced level of finished surface of earth is known as _____.
a) Formation Level b) Kerb
c) Right of Way d) Side drain
- 3) Construction of transmission towers is the relevance of Civil engineering with _____.
a) Computer Engineering b) Mechanical Engineering
c) IT Engineering d) Electrical Engineering
- 4) Substructure consists of _____.
a) Foundation b) Window
c) Parapet d) All above
- 5) Salient features of a green building are _____.
a) Minimal disturbance to landscapes and site condition
b) Use of recycled and environmental friendly building materials
c) Use of non-toxic and recycled / recyclable materials / energy efficient and co-friendly equipment
d) All of the above
- 6) Hardware, software, data and people, these are components of _____.
a) GPS b) RS
c) GIS d) Total station
- 7) Rain water harvesting is required for _____.
a) Ground water table recharge b) Bore-well recharge
c) Storage for future use d) All the above

Section - II**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:07

Q.1 Choose the correct alternatives from the options and rewrite the sentence.**07**

- 1) Internal energy is defined by _____.
 - a) Zeroth law of thermodynamics
 - b) First law of thermodynamics
 - c) Second law of thermodynamics
 - d) Law of entropy
- 2) The pump transfers the mechanical energy of a motor or of an engine into _____ of a fluid.
 - a) Pressure energy
 - b) kinetic energy
 - c) Either pressure energy or kinetic energy
 - d) pressure energy, kinetic energy or both
- 3) In which of the following welding process, electrodes get consumed _____.
 - a) TIG welding
 - b) Resistance welding
 - c) Thermit welding
 - d) Arc welding
- 4) The part of carriage which guides along guide ways of lathe bed is called _____.
 - a) Apron
 - b) Tool post
 - c) saddle
 - d) Cross slide
- 5) The process of removing material from the face of work piece is called _____.
 - a) Facing
 - b) Chamfering
 - c) Knurling
 - d) None of these
- 6) Method of joining two work pieces made of dissimilar material by heating above 450° C and below melting point is called _____.
 - a) Welding
 - b) Brazing
 - c) Soldering
 - d) None of these
- 7) Which of the following is an intensive property of a thermodynamic system?
 - a) Volume
 - b) Temperature
 - c) Mass
 - d) Energy

Seat No.	
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Set	S
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering (BTN10104)

Day & Date: Wednesday, 15-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Q. 2 & Q. 4 are short answer type questions.
2) Q. 3 and Q. 5 are long answer type questions.
3) Neat diagram must be drawn whenever necessary.
4) Figures to the right indicates full marks.
5) Assume additional suitable data if necessary and state it clearly.
6) Use of log tables and non-programmable single memory calculator is allowed.

Section – I

- Q.2 Attempt any five of the following questions. 15**
- a) What are the sub branches of civil engineering? Explain any one in short.
 - b) Explain the various sources of water in detail.
 - c) Draw the cross section of concrete dam and show various levels.
 - d) Differentiate between shallow foundation and deep foundation with suitable examples.
 - e) Explain the Indore method of composting.
 - f) Write any three applications of GIS.
 - g) What are the objectives of carrying out surveying?
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) Draw a neat sketch of road structure in cutting. **05**
 - b) Explain Effluent Treatment plant. **05**
 - c) With neat sketch explain any two types of shallow foundation. **04**
 - d) Write note on Principle of surveying. **04**
 - e) Write the difference between GIS and GPS. **04**
 - f) What is bridge? Write the classification of Bridges. **04**

- Instructions:** 1) Use of scientific calculator is allowed.
2) Figures to the right indicates full marks.
3) Assume additional suitable data if necessary and state it clearly.
4) Use university graph paper & semi-log paper if required.

Section – II

Q.2 Attempt any three. **12**

- a) Explain construction and working of Reciprocating Pump with neat sketch.
- b) Explain Pelton Turbine with neat sketch.
- c) Explain metal arc welding with neat sketch.
- d) Explain basic elements of Drilling machine.

Q.3 Attempt any two. **10**

- a) Derive an equation to calculate length of Open Belt Drive.
- b) Describe steady flow energy equation.
- c) Explain oxy acetylene welding.

Q.4 Attempt any one. **06**

- a) A cycle consists of three processes. The energy transfer in each process is tabulated below Complete the table & determines the network of cycle.

Process	Q (kw)	W(Kw)	$\Delta U(Kw)$
1-2	50	-	20
2-3	-30	-40	-
3-1	-	-	-30

- b) Describe Lathe Machine with its block diagram

Seat No.	
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Day & Date: Friday, 17-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

- [illegible]

- 9) The area under v-t curve presents _____.
a) Average velocity of particles
b) Instantaneous velocity of particle
c) Distance traveled by particle
d) Acceleration of particle
- 10) Mass moment of inertia of pulley is given by in terms of k is _____.
a) $I = m^2k$
b) $I = mk^2$
c) $I = k^2/m$
d) m^2/k
- 11) When the acceleration is _____, velocity of particle is constant.
a) Constant but non-zero
b) Maximum
c) Zero
d) None of the above
- 12) The time rate of doing work is known as _____.
a) Potential Energy
b) Kinetic Energy
c) Power
d) None of these
- 13) Unit of impulse of force is, _____.
a) N-sec
b) N/sec
c) N/Sec²
d) N
- 14) In motion under gravity initial & final velocity is given then distance traveled by body is given by _____.
a) $s = ut + \frac{1}{2}at^2$
b) $v^2 - u^2 = 2as$
c) $v = u + at$
d) None of these

Seat No.	
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Mechanics (BTN10105)

Day & Date: Friday, 17-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Use of non-programmable scientific calculators is allowed.
 3) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following questions.

12

- State and prove Varignon's theorem.
- State and prove Lami's theorem.
- State the assumptions made in analysis of perfect frame.
- State the parallel Axis theorem.
- Find the value of the forces P and Q if the system is in equilibrium as shown in Fig 1.

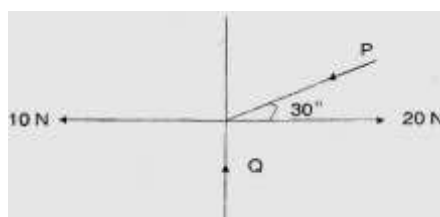


Fig 1

- Find support reactions for the beam as shown in Fig 2.

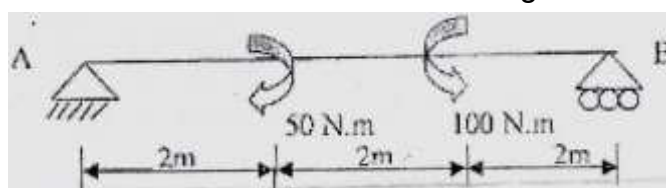


Fig 2

Q.3 Attempt any two of the following questions.

16

- Two smooth cylinders with radius and weights as shown in Fig. 3 are kept in a groove with slanting surfaces. Determine the reactions at contact points.

Cylinder	Radius	Weight
1	125 mm	500 N
2	200 mm	800 N

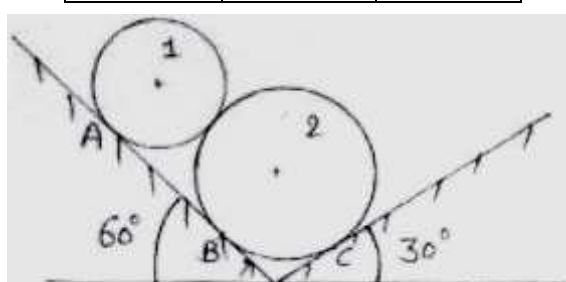


Fig 3

SLR-JE-710

Set **P**

- b) Find the forces in all the members of the truss as shown in Fig. 4

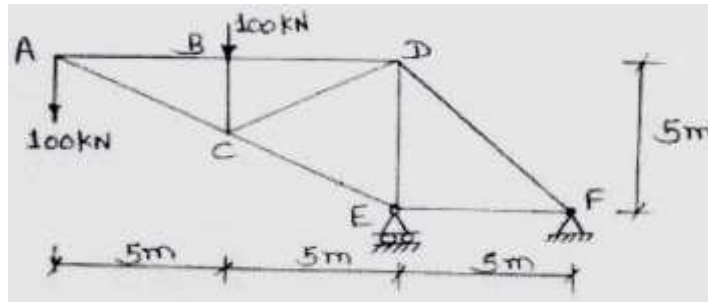


Fig 4

- c) Find the moment of inertia about centroidal axis

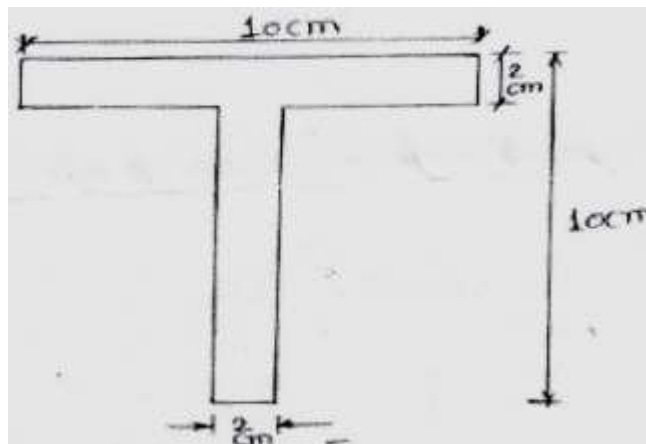


Fig 5

Section – II

Q.4 Attempt any four of the following questions.

12

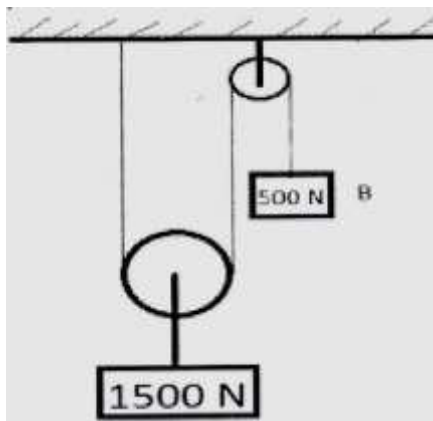
- Explain different types of motion curves.
- A small steel ball is shot vertically upwards from the top of a building 25m above the ground with an initial velocity of 18m/s.
Find
 - In what time it will reach the maximum height.
 - How high above the building will the ball rise?
- State and explain principle of conservation of Energy.
- A 20kN automobile is moving at a speed of 70 kmph when the breaks are applied causing all four wheels to skid. Determine the time required to stop the automobile
 - On concrete road for which $\mu=0.75$
 - On ice for which $\mu=0.08$
- Explain coefficient of restitution.
- State types of mechanical vibrations. Explain single degree of freedom.

Q.5 Attempt any two of the following questions.

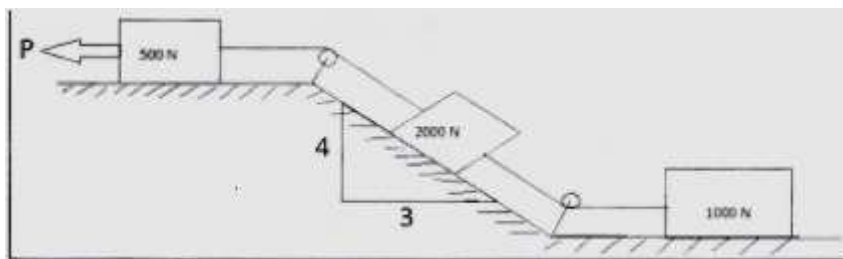
- a) A bullet is fired upward at an angle of 30° with horizontal from point P on hill and hit the target which is 80 m lower than P. Initial velocity of bullet is 100m/s.

Calculate:

- the maximum height up to which bullet will reach above horizontal
 - the velocity with which bullet strikes the ground
 - total time of flight required
- b) Determine the tension in the string and acceleration of block A and B weighing 1500 N and 500 N connected by an inextensible string as shown below. Assume pulleys as frictionless and weightless.



- c) Determine the constant force P that will give the system of bodies as shown below, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3, pulleys are smooth.



Seat No.	
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Day & Date: Friday, 17-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

- Page 6 of 20

- 9) A tripod carrying a dumpy level is the example of _____.
a) Non-coplanar concurrent forces
b) Co-planar concurrent forces
c) Non-coplanar non-concurrent forces
d) Co-linear forces
- 10) A couple produces _____.
a) Translatory motion
b) Rotational motion
c) Both translation & rotation
d) None of these
- 11) To solve a truss by method of joints, the number of unknown forces at a joint should not be _____.
a) Less than two
b) More than two
c) More than three
d) Cannot said
- 12) The center of gravity of a semicircle lies at a distance of _____ from its base measured along vertical radius.
a) $3r/4\pi$
b) $4r/3\pi$
c) $4\pi/3r$
d) $3\pi/4r$
- 13) The M.I. of a triangular section of base (b) & height (h) about an axis passing through its vertex parallel to the base is _____ as that passes through its C.G. & parallel to the base.
a) Twelve times
b) Nine times
c) Six times
d) Four times
- 14) A truss of framed structure is perfect if the number of members are _____ (2j-3) where j is the number of joints.
a) Less than
b) Greater than
c) Equal to
d) Either (a) or (c)

Seat No.	
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Set **Q**

F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Mechanics (BTN10105)

Day & Date: Friday, 17-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Use of non-programmable scientific calculators is allowed.
 3) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following questions.

12

- State and prove Varignon's theorem.
- State and prove Lami's theorem.
- State the assumptions made in analysis of perfect frame.
- State the parallel Axis theorem.
- Find the value of the forces P and Q if the system is in equilibrium as shown in Fig 1.

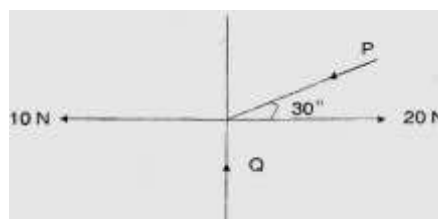


Fig 1

- Find support reactions for the beam as shown in Fig 2.

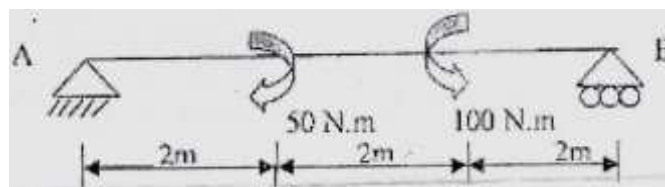


Fig 2

Q.3 Attempt any two of the following questions.

16

- Two smooth cylinders with radius and weights as shown in Fig. 3 are kept in a groove with slanting surfaces. Determine the reactions at contact points.

Cylinder	Radius	Weight
1	125 mm	500 N
2	200 mm	800 N

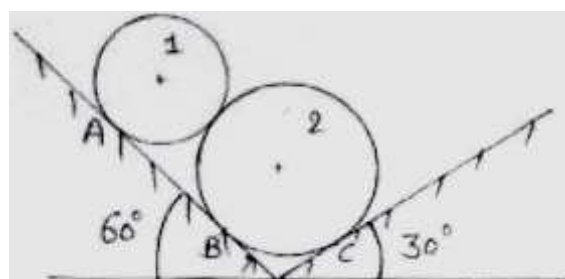


Fig 3

- b) Find the forces in all the members of the truss as shown in Fig. 4

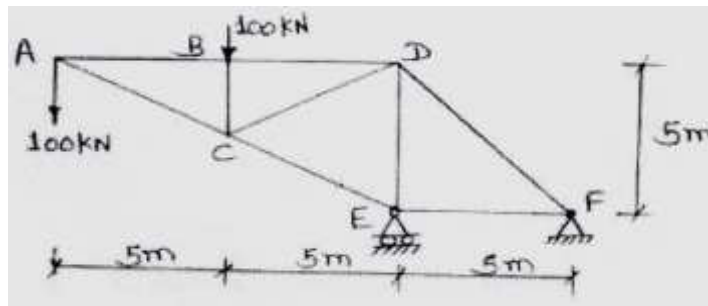


Fig 4

- c) Find the moment of inertia about centroidal axis

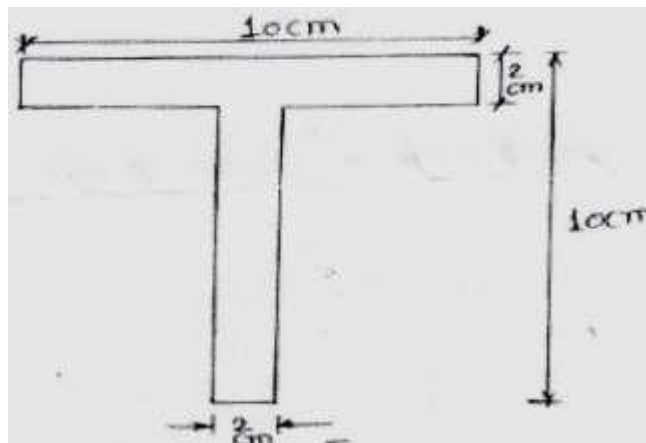


Fig 5

Section – II

Q.4 Attempt any four of the following questions.

12

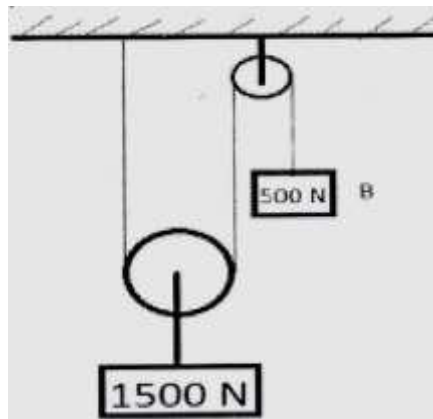
- Explain different types of motion curves.
- A small steel ball is shot vertically upwards from the top of a building 25m above the ground with an initial velocity of 18m/s.
Find
 - In what time it will reach the maximum height.
 - How high above the building will the ball rise?
- State and explain principle of conservation of Energy.
- A 20kN automobile is moving at a speed of 70 kmph when the breaks are applied causing all four wheels to skid. Determine the time required to stop the automobile
 - On concrete road for which $\mu=0.75$
 - On ice for which $\mu=0.08$
- Explain coefficient of restitution.
- State types of mechanical vibrations. Explain single degree of freedom.

Q.5 Attempt any two of the following questions.

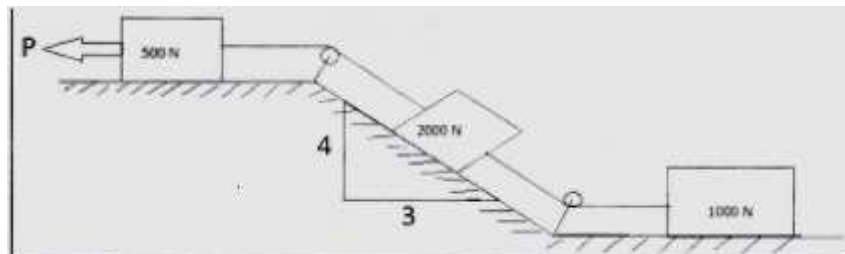
- a) A bullet is fired upward at an angle of 30° with horizontal from point P on hill and hit the target which is 80 m lower than P. Initial velocity of bullet is 100m/s.

Calculate:

- the maximum height up to which bullet will reach above horizontal
 - the velocity with which bullet strikes the ground
 - total time of flight required
- b) Determine the tension in the string and acceleration of block A and B weighing 1500 N and 500 N connected by an inextensible string as shown below. Assume pulleys as frictionless and weightless.



- c) Determine the constant force P that will give the system of bodies as shown below, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3, pulleys are smooth.



Seat No.	
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Mechanics (BTN10105)

Day & Date: Friday, 17-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

- 1) When the acceleration is _____, velocity of particle is constant.
 - a) Constant but non-zero
 - b) Maximum
 - c) Zero
 - d) None of the above
- 2) The time rate of doing work is known as _____.
 - a) Potential Energy
 - b) Kinetic Energy
 - c) Power
 - d) None of these
- 3) Unit of impulse of force is, _____.
 - a) N-sec
 - b) N/sec
 - c) N/Sec²
 - d) N
- 4) In motion under gravity initial & final velocity is given then distance traveled by body is given by _____.
 - a) $s = ut + \frac{1}{2}at^2$
 - b) $v^2 - u^2 = 2as$
 - c) $v = u + at$
 - d) None of these
- 5) The process of finding the components is called _____.
 - a) Composition
 - b) Resolution
 - c) Idealization
 - d) Summation
- 6) A tripod carrying a dumpy level is the example of _____.
 - a) Non-coplanar concurrent forces
 - b) Co-planar concurrent forces
 - c) Non-coplanar non-concurrent forces
 - d) Co-linear forces
- 7) A couple produces _____.
 - a) Translatory motion
 - b) Rotational motion
 - c) Both translation & rotation
 - d) None of these
- 8) To solve a truss by method of joints, the number of unknown forces at a joint should not be _____.
 - a) Less than two
 - b) More than two
 - c) More than three
 - d) Cannot said

Seat No.	
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Set **R**

F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Mechanics (BTN10105)

Day & Date: Friday, 17-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Use of non-programmable scientific calculators is allowed.
 3) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following questions.

12

- State and prove Varignon's theorem.
- State and prove Lami's theorem.
- State the assumptions made in analysis of perfect frame.
- State the parallel Axis theorem.
- Find the value of the forces P and Q if the system is in equilibrium as shown in Fig 1.

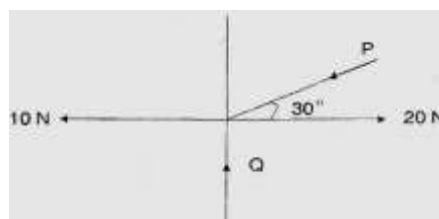


Fig 1

- Find support reactions for the beam as shown in Fig 2.

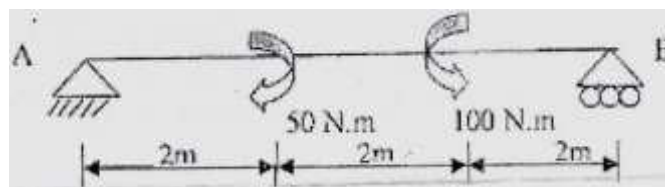


Fig 2

Q.3 Attempt any two of the following questions.

16

- Two smooth cylinders with radius and weights as shown in Fig. 3 are kept in a groove with slanting surfaces. Determine the reactions at contact points.

Cylinder	Radius	Weight
1	125 mm	500 N
2	200 mm	800 N

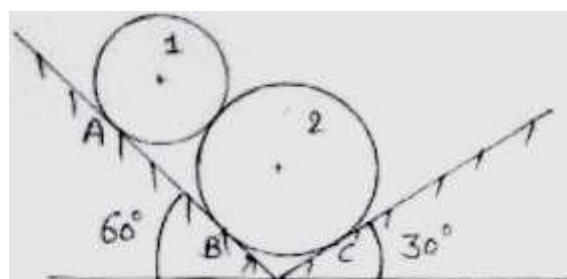


Fig 3

- b) Find the forces in all the members of the truss as shown in Fig. 4

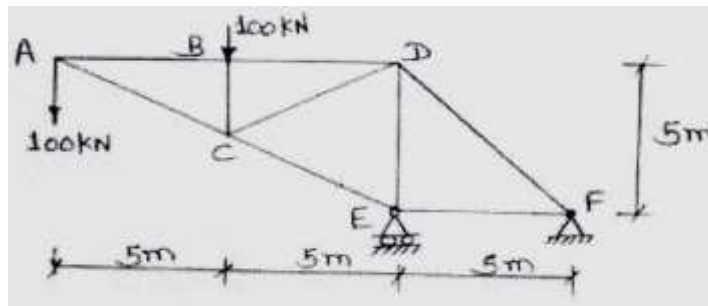


Fig 4

- c) Find the moment of inertia about centroidal axis

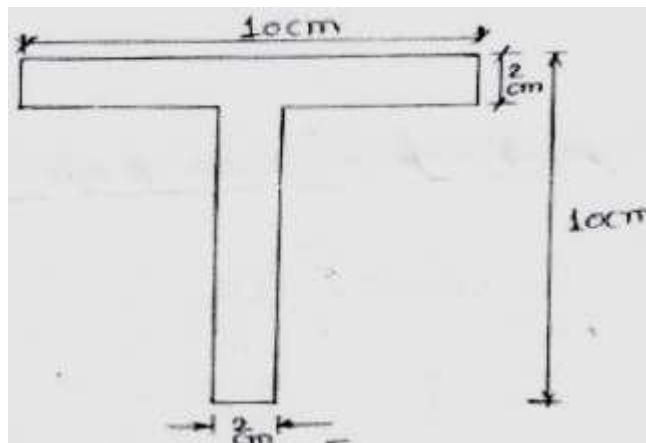


Fig 5

Section – II

Q.4 Attempt any four of the following questions.

12

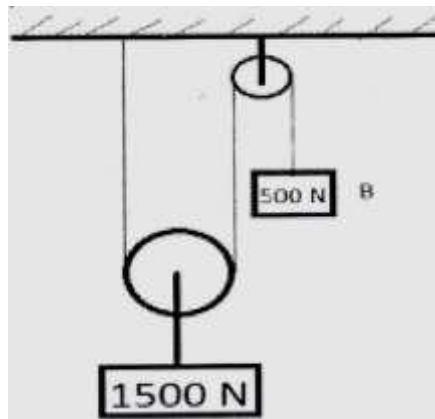
- Explain different types of motion curves.
- A small steel ball is shot vertically upwards from the top of a building 25m above the ground with an initial velocity of 18m/s.
Find
 - In what time it will reach the maximum height.
 - How high above the building will the ball rise?
- State and explain principle of conservation of Energy.
- A 20kN automobile is moving at a speed of 70 kmph when the breaks are applied causing all four wheels to skid. Determine the time required to stop the automobile
 - On concrete road for which $\mu=0.75$
 - On ice for which $\mu=0.08$
- Explain coefficient of restitution.
- State types of mechanical vibrations. Explain single degree of freedom.

Q.5 Attempt any two of the following questions.

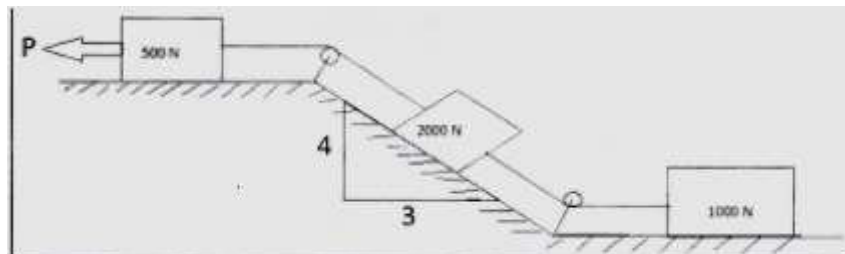
- a) A bullet is fired upward at an angle of 30° with horizontal from point P on hill and hit the target which is 80 m lower than P. Initial velocity of bullet is 100m/s.

Calculate:

- the maximum height up to which bullet will reach above horizontal
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 - total time of flight required
- b) Determine the tension in the string and acceleration of block A and B weighing 1500 N and 500 N connected by an inextensible string as shown below. Assume pulleys as frictionless and weightless.



- c) Determine the constant force P that will give the system of bodies as shown below, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3, pulleys are smooth.



Seat No.	
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Mechanics (BTN10105)

Day & Date: Friday, 17-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

- 1) The M.I. of a triangular section of base (b) & height (h) about an axis passing through its vertex parallel to the base is _____ as that passes through its C.G. & parallel to the base.
 - a) Twelve times
 - b) Nine times
 - c) Six times
 - d) Four times
- 2) A truss of framed structure is perfect if the number of members are _____ (2j-3) where j is the number of joints.
 - a) Less than
 - b) Greater than
 - c) Equal to
 - d) Either (a) or (c)
- 3) The velocity of body reaching ground from length h is, _____.
 - a) $2\sqrt{gh}$
 - b) \sqrt{gh}
 - c) $\sqrt{2gh}$
 - d) $2g\sqrt{h}$
- 4) The area under v-t curve presents _____.
 - a) Average velocity of particles
 - b) Instantaneous velocity of particle
 - c) Distance traveled by particle
 - d) Acceleration of particle
- 5) Mass moment of inertia of pulley is given by in terms of k is _____.
 - a) $I = m^2k$
 - b) $I = mk^2$
 - c) $I = k^2/m$
 - d) m^2/k
- 6) When the acceleration is _____, velocity of particle is constant.
 - a) Constant but non-zero
 - b) Maximum
 - c) Zero
 - d) None of the above
- 7) The time rate of doing work is known as _____.
 - a) Potential Energy
 - b) Kinetic Energy
 - c) Power
 - d) None of these
- 8) Unit of impulse of force is, _____.
 - a) N-sec
 - b) N/sec
 - c) N/Sec²
 - d) N

- 9) In motion under gravity initial & final velocity is given then distance traveled by body is given by _____.
a) $s = ut + \frac{1}{2}at^2$ b) $v^2 - u^2 = 2as$
c) $v = u + at$ d) None of these
- 10) The process of finding the components is called _____.
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c) Idealization d) Summation
- 11) A tripod carrying a dumpy level is the example of _____.
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b) Co-planar concurrent forces
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d) Co-linear forces
- 12) A couple produces _____.
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c) More than three d) Cannot said
- 14) The center of gravity of a semicircle lies at a distance of _____ from its base measured along vertical radius.
a) $3r/4\pi$ b) $4r/3\pi$
c) $4\pi/3r$ d) $3\pi/4r$

Seat No.	
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Set **S**

F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Engineering Mechanics (BTN10105)

Day & Date: Friday, 17-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Use of non-programmable scientific calculators is allowed.
 3) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following questions.

12

- State and prove Varignon's theorem.
- State and prove Lami's theorem.
- State the assumptions made in analysis of perfect frame.
- State the parallel Axis theorem.
- Find the value of the forces P and Q if the system is in equilibrium as shown in Fig 1.

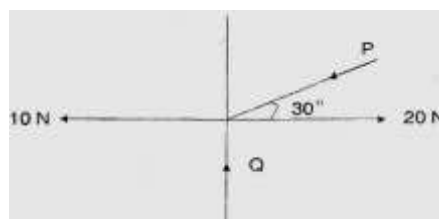


Fig 1

- Find support reactions for the beam as shown in Fig 2.

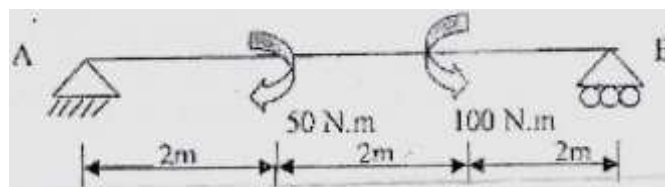


Fig 2

Q.3 Attempt any two of the following questions.

16

- Two smooth cylinders with radius and weights as shown in Fig. 3 are kept in a groove with slanting surfaces. Determine the reactions at contact points.

Cylinder	Radius	Weight
1	125 mm	500 N
2	200 mm	800 N

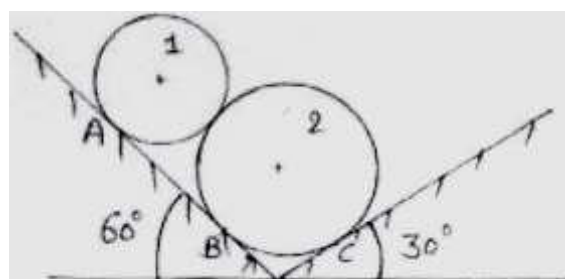


Fig 3

- b) Find the forces in all the members of the truss as shown in Fig. 4

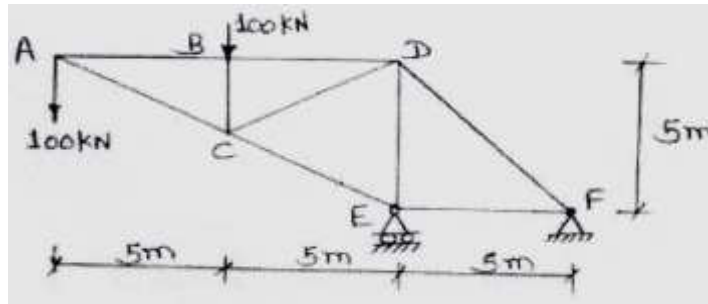


Fig 4

- c) Find the moment of inertia about centroidal axis

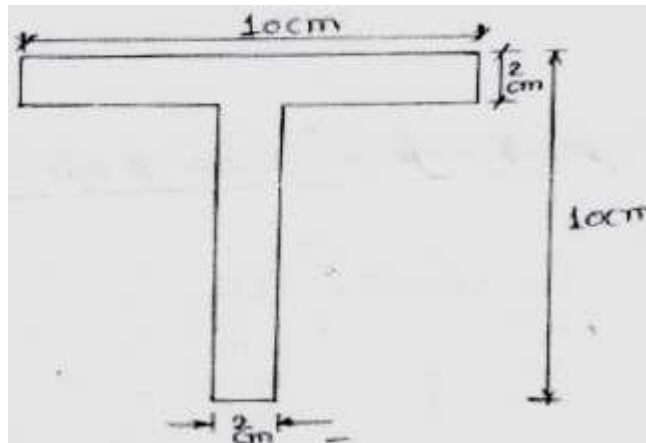


Fig 5

Section – II

Q.4 Attempt any four of the following questions.

12

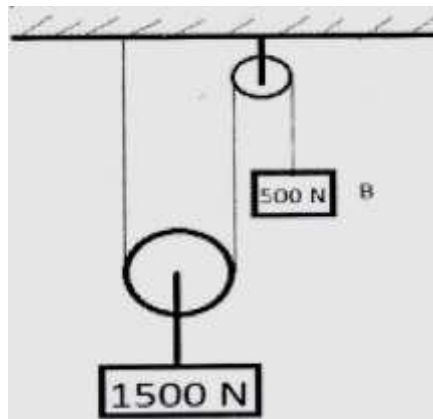
- Explain different types of motion curves.
- A small steel ball is shot vertically upwards from the top of a building 25m above the ground with an initial velocity of 18m/s.
Find
 - In what time it will reach the maximum height.
 - How high above the building will the ball rise?
- State and explain principle of conservation of Energy.
- A 20kN automobile is moving at a speed of 70 kmph when the breaks are applied causing all four wheels to skid. Determine the time required to stop the automobile
 - On concrete road for which $\mu=0.75$
 - On ice for which $\mu=0.08$
- Explain coefficient of restitution.
- State types of mechanical vibrations. Explain single degree of freedom.

Q.5 Attempt any two of the following questions.

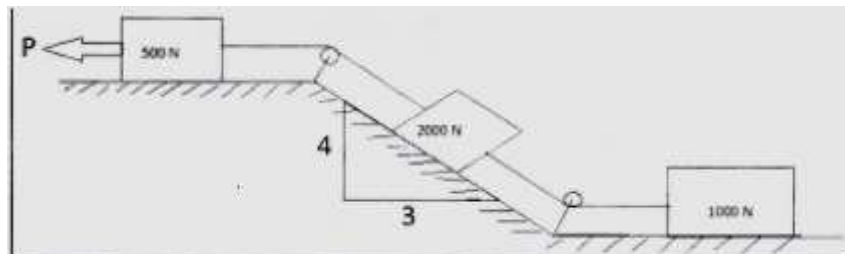
- a) A bullet is fired upward at an angle of 30° with horizontal from point P on hill and hit the target which is 80 m lower than P. Initial velocity of bullet is 100m/s.

Calculate:

- the maximum height up to which bullet will reach above horizontal
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 - total time of flight required
- b) Determine the tension in the string and acceleration of block A and B weighing 1500 N and 500 N connected by an inextensible string as shown below. Assume pulleys as frictionless and weightless.



- c) Determine the constant force P that will give the system of bodies as shown below, a velocity of 3 m/s after moving 4.5 m from the rest. Coefficient of friction between the blocks and plane is 0.3, pulleys are smooth.



Seat No.	
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Set **P**

Marks Obtained	
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Signature of Examiner	
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Signature of Junior Supervisor	
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Universal Human Values (BTN10106)

Day & Date: Saturday, 18-05-2024
 Time: 10:00 AM To 11:30 AM

Max. Marks: 50

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Mention Question Paper Set (P/Q/R/S) on Top of Page.

Answer

Q.1 Choose the correct alternatives from the options.

- | | |
|--|--------------------------|
| 1) Value education deals with _____.
a) What is universally valuable to all of us
b) What is conducive to our individual and collective of us
c) Enables to be in harmony with ourselves, other and rest of nature
d) All of the above | <input type="checkbox"/> |
| 2) Self-Exploration demands examination and _____ of our belief again and again.
a) Validation
b) Presentation
c) Demonstration
d) Representation | <input type="checkbox"/> |
| 3) Any course content on value education needs to be _____.
a) Universal
b) Rational
c) Natural
d) All of above | <input type="checkbox"/> |
| 4) _____ is the basic unit of any human society.
a) Group
b) Individual
c) Nature
d) Society | <input type="checkbox"/> |
| 5) Present Education system gives more value to skills _____.
a) True
b) False | <input type="checkbox"/> |
| 6) Right Understanding and relationships lead to _____.
a) Mutual Happiness
b) Mutual Prosperity
c) Both a and b
d) None | <input type="checkbox"/> |
| 7) Value education should be Natural and verifiable means _____.
a) Intellectual and Informative
b) Naturally accepted and experimentally
c) both a and b
d) None | <input type="checkbox"/> |
| 8) Are the content of self-exploration _____.
a) Program
b) Desire
c) both a and b
d) None | <input type="checkbox"/> |
| 9) To be in state of liking is _____.
a) Happy
b) Unhappy
c) both a and b
d) None of the above | <input type="checkbox"/> |

- 10) Which of the following is NOT TRUE?
 a) Values vary from person to person
 b) Values hold a higher priority in education
 c) Values guide the skills
 d) Skills and values are complementary
- 11) Which of the following is not a level of living for a human being?
 a) Family
 b) Society
 c) Individual
 d) Profession
- 12) What a human being really wants to be, is something that is?
 a) Pre-conditioned
 b) Naturally Acceptable
 c) Based on belief systems
 d) Temporary
- 13) What is the first priority for a human being?
 a) Physical facility
 b) Relationship
 c) Right Understanding
 d) Money
- 14) _____ helps the human being to transform from Animal consciousness to human consciousness.
 a) Physical Facility
 b) Right understanding
 c) Relationship
 d) All of above
- 15) _____ means physical facilities more than to satisfy my needs.
 a) Health
 b) Prosperity
 c) Happiness
 d) None of above
- 16) Physical facilities are necessary and complete for _____.
 a) Animal
 b) Human being
 c) Nature
 d) All of the above
- 17) SSSS stands for _____.
 a) Sadhan Viheen Dukhi Daridra
 b) Sadhan Sampan Dukhi Daridra
 c) Sadhan Sampan Sukhi Samridha
 d) None of the above
- 18) Self and _____ are different in nature, materiality, needs and activities.
 a) Trust
 b) Body
 c) Belief
 d) None
- 19) Sukh and _____ both are needed and can't replace each other.
 a) Self
 b) Body
 c) Suvidha
 d) Belief
- 20) Where there is harmony among the parts of the body, it is known as _____.
 a) Swasthya
 b) Sanyam
 c) Prosperity
 d) None
- 21) The self is _____ In nature while body is _____ in nature.
 a) Conscious, Physico-chemical
 b) Unconscious, Physico-chemical
 c) Conscious, Conscious
 d) None
- 22) When we assume something about on the prevailing notion is called _____.
 a) Knowing
 b) Preconditioning
 c) Sensation
 d) Natural acceptance

- 23) The requirement of body is nurturing, _____ and right utilization.
a) Desire
b) Protection
c) Thought
d) Expectation
- 24) I being the _____.
a) doer, seer and Enjoyer
b) Doer
c) Seer
d) Enjoyer
- 25) _____ means one who is cable of taking decisions.
a) Doer
b) Seer
c) Enjoyer
d) None
- 26) The process of education and right living leads to _____ in the individual,
a) Right understanding
b) Health
c) Prosperity
d) None
- 27) To be assured of others at all time is the feeling of _____.
a) Respect
b) Love
c) Trust
d) Glory
- 28) _____ Means right evaluation.
a) Respect
b) Love
c) Trust
d) Glory
- 29) Acceptance of excellence in others is called _____.
a) Reverence
b) Glory
c) Gratitude
d) Guidance
- 30) Saha-Astitwa means _____.
a) Right understanding
b) Trust
c) Prosperity
d) Co-existence
- 31) _____ is the human value which is all-encompassing.
a) Love
b) Glory
c) Care
d) Gratitude
- 32) Harmony in the family is the building block for harmony in the _____.
a) Society
b) Individual
c) Friend
d) Relative
- 33) Human development essentially means _____.
a) Transformation from animal consciousness to human consciousness
b) Earning more and more physical facility
c) Being the best for all
d) Making the human race the strongest to all
- 34) Which of the following is the naturally acceptable in relationship?
a) Relationship based on Love
b) Relationship based on Physical facility
c) Relationship based on Body
d) Relationship based on Money
- 35) With right understanding, if the other has more understanding, is more responsible than me, then _____.
a) I am committed to make the other differentiate
b) I am committed to make the other understand
c) I am committed to differentiate from the other
d) I am committed to understand from other

- 36) Which one of the following is not a basic requirement for fulfillment of aspirations of every human being _____.
 a) Right Understanding b) Relationship
 c) Physical Facility d) Status in Society ☐
- 37) The naturally acceptable feelings in relationship are _____.
 a) Same for all time
 b) Different for different time
 c) Very from time to time
 d) Sometimes definite sometimes indefinite ☐
- 38) Which of the following does not form an order in nature?
 a) Bio b) Animal
 c) Consciousness d) Physical ☐
- 39) All the units of nature can be classified into _____ orders.
 a) Two b) Three
 c) Four d) Six ☐
- 40) _____ is the foundational value in relationship.
 a) Respect b) Love
 c) Trust d) Glory ☐
- 41) Correct priority for Physical Facilities; Right Understanding and Relationship.
 a) Physical Facilities, Right Understanding and Relationship
 b) Right Understanding, Relationship and Physical Facilities
 c) Relationship, Right Understanding and Physical Facilities
 d) None of the above ☐
- 42) When we live with correct understanding of values we feel _____.
 a) Deprived b) Frustrated
 c) Happy d) Unhappy ☐
- 43) We all are differ at the level of our _____ but similar in our _____.
 a) Competence, Intension b) Intension, Competence
 c) Competence, Competence d) None ☐
- 44) The needs of the self are _____ in time and needs of body are _____.
 a) Discontinuous, Permanent b) Continuous, temporary
 c) Happiness, Permanent d) None of above ☐
- 45) What are the basic desires of every human being for which they are working?
 a) Physical facilities
 b) Realisation and understanding
 c) Happiness
 d) Continuous happiness and prosperity ☐
- 46) To maintain harmony, we have to work at four levels of living. Identify second level of living.
 a) Self b) Family
 c) Society d) nature ☐
- 47) Content of self-exploration are _____.
 a) desire and need b) program and needs
 c) program and practical d) desire and program ☐

- 48)** A person who are lack of physical facility stands for _____.
a) Samadhan viheen dukhi daridra
b) Sadhan sampanna dukhi daridra
c) Sadhan Viheen Dukhi Daridra
d) Sadhan vimukh sukhi samrudha
- 49)** According to quantity, which of the following is true for the orders in nature?
a) Bio order » physical order » Animal order » Human order
b) Animal order » Bio order » physical order » Human order
c) Physical order » Bio order » Animal order » Human order
d) Physical order » Animal order » Bio order » Human order
- 50)** Which of the following statement is not true?
a) There is interconnectedness in nature
b) There is recyclability and self-regulation in nature
c) There is struggle for survival in nature
d) There is mutual fulfillment in nature

☐☐☐

Seat No.	
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Set **Q**

Marks Obtained	
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Signature of Examiner	
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Signature of Junior Supervisor	
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Universal Human Values (BTN10106)

Day & Date: Saturday, 18-05-2024
 Time: 10:00 AM To 11:30 AM

Max. Marks: 50

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Mention Question Paper Set (P/Q/R/S) on Top of Page.

Answer**Q.1 Choose the correct alternatives from the options.**

- 1) _____ is the human value which is all-encompassing.

a) Love	b) Glory	<input type="text"/>
c) Care	d) Gratitude	
- 2) Harmony in the family is the building block for harmony in the _____.

a) Society	b) Individual	<input type="text"/>
c) Friend	d) Relative	
- 3) Human development essentially means _____.

a) Transformation from animal consciousness to human consciousness	<input type="text"/>
b) Earning more and more physical facility	
c) Being the best for all	
d) Making the human race the strongest to all	
- 4) Which of the following is the naturally acceptable in relationship?

a) Relationship based on Love	<input type="text"/>
b) Relationship based on Physical facility	
c) Relationship based on Body	
d) Relationship based on Money	
- 5) With right understanding, if the other has more understanding, is more responsible than me, then _____.

a) I am committed to make the other differentiate	<input type="text"/>
b) I am committed to make the other understand	
c) I am committed to differentiate from the other	
d) I am committed to understand from other	
- 6) Which one of the following is not a basic requirement for fulfillment of aspirations of every human being _____.

a) Right Understanding	b) Relationship	<input type="text"/>
c) Physical Facility	d) Status in Society	
- 7) The naturally acceptable feelings in relationship are _____.

a) Same for all time	<input type="text"/>
b) Different for different time	
c) Very from time to time	
d) Sometimes definite sometimes indefinite	

- 8) Which of the following does not form an order in nature?
 - a) Bio
 - b) Animal
 - c) Consciousness
 - d) Physical
 - 9) All the units of nature can be classified into _____ orders.
 - a) Two
 - b) Three
 - c) Four
 - d) Six
 - 10) _____ is the foundational value in relationship.
 - a) Respect
 - b) Love
 - c) Trust
 - d) Glory
 - 11) Correct priority for Physical Facilities; Right Understanding and Relationship.
 - a) Physical Facilities, Right Understanding and Relationship
 - b) Right Understanding, Relationship and Physical Facilities
 - c) Relationship, Right Understanding and Physical Facilities
 - d) None of the above
 - 12) When we live with correct understanding of values we feel _____.
 - a) Deprived
 - b) Frustrated
 - c) Happy
 - d) Unhappy
 - 13) We all are differ at the level of our _____ but similar in our _____.
 - a) Competence, Intension
 - b) Intension, Competence
 - c) Competence, Competence
 - d) None
 - 14) The needs of the self are _____ in time and needs of body are _____.
 - a) Discontinuous, Permanent
 - b) Continuous, temporary
 - c) Happiness, Permanent
 - d) None of above
 - 15) What are the basic desires of every human being for which they are working?
 - a) Physical facilities
 - b) Realisation and understanding
 - c) Happiness
 - d) Continuous happiness and prosperity
 - 16) To maintain harmony, we have to work at four levels of living. Identify second level of living.
 - a) Self
 - b) Family
 - c) Society
 - d) nature
 - 17) Content of self-exploration are _____.
 - a) desire and need
 - b) program and needs
 - c) program and practical
 - d) desire and program
 - 18) A person who are lack of physical facility stands for _____.
 - a) Samadhan viheen dukhi daridra
 - b) Sadhan sampanna dukhi daridra
 - c) Sadhan Viheen Dukhi Daridra
 - d) Sadhan vimukh sukhi samrudha

- 19) According to quantity, which of the following is true for the orders in nature?
- a) Bio order » physical order » Animal order » Human order
 - b) Animal order » Bio order » physical order » Human order
 - c) Physical order » Bio order » Animal order » Human order
 - d) Physical order » Animal order » Bio order » Human order
- 20) Which of the following statement is not true?
- a) There is interconnectedness in nature
 - b) There is recyclability and self-regulation in nature
 - c) There is struggle for survival in nature
 - d) There is mutual fulfillment in nature
- 21) Value education deals with ____.
- a) What is universally valuable to all of us
 - b) What is conducive to our individual and collective of us
 - c) Enables to be in harmony with ourselves, other and rest of nature
 - d) All of the above
- 22) Self-Exploration demands examination and ____ of our belief again and again.
- a) Validation
 - b) Presentation
 - c) Demonstration
 - d) Representation
- 23) Any course content on value education needs to be ____.
- a) Universal
 - b) Rational
 - c) Natural
 - d) All of above
- 24) ____ is the basic unit of any human society.
- a) Group
 - b) Individual
 - c) Nature
 - d) Society
- 25) Present Education system gives more value to skills ____.
- a) True
 - b) False
- 26) Right Understanding and relationships lead to ____.
- a) Mutual Happiness
 - b) Mutual Prosperity
 - c) Both a and b
 - d) None
- 27) Value education should be Natural and verifiable means ____.
- a) Intellectual and Informative
 - b) Naturally accepted and experimentally
 - c) both a and b
 - d) None
- 28) Are the content of self-exploration ____.
- a) Program
 - b) Desire
 - c) both a and b
 - d) None
- 29) To be in state of liking is ____.
- a) Happy
 - b) Unhappy
 - c) both a and b
 - d) None of the above

- 30) Which of the following is NOT TRUE?
 a) Values vary from person to person
 b) Values hold a higher priority in education
 c) Values guide the skills
 d) Skills and values are complementary
- 31) Which of the following is not a level of living for a human being?
 a) Family
 b) Society
 c) Individual
 d) Profession
- 32) What a human being really wants to be, is something that is?
 a) Pre-conditioned
 b) Naturally Acceptable
 c) Based on belief systems
 d) Temporary
- 33) What is the first priority for a human being?
 a) Physical facility
 b) Relationship
 c) Right Understanding
 d) Money
- 34) _____ helps the human being to transform from Animal consciousness to human consciousness.
 a) Physical Facility
 b) Right understanding
 c) Relationship
 d) All of above
- 35) _____ means physical facilities more than to satisfy my needs.
 a) Health
 b) Prosperity
 c) Happiness
 d) None of above
- 36) Physical facilities are necessary and complete for _____.
 a) Animal
 b) Human being
 c) Nature
 d) All of the above
- 37) SSSS stands for _____.
 a) Sadhan Viheen Dukhi Daridra
 b) Sadhan Sampan Dukhi Daridra
 c) Sadhan Sampan Sukhi Samridha
 d) None of the above
- 38) Self and _____ are different in nature, materiality, needs and activities.
 a) Trust
 b) Body
 c) Belief
 d) None
- 39) Sukh and _____ both are needed and can't replace each other.
 a) Self
 b) Body
 c) Suvidha
 d) Belief
- 40) Where there is harmony among the parts of the body, it is known as _____.
 a) Swasthya
 b) Sanyam
 c) Prosperity
 d) None
- 41) The self is _____ In nature while body is _____ in nature.
 a) Conscious, Physico-chemical
 b) Unconscious, Physico-chemical
 c) Conscious, Conscious
 d) None
- 42) When we assume something about on the prevailing notion is called _____.
 a) Knowing
 b) Preconditioning
 c) Sensation
 d) Natural acceptance

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Marks Obtained		Signature of Examiner		Signature of Junior Supervisor	
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Universal Human Values (BTN10106)

Day & Date: Saturday, 18-05-2024
Time: 10:00 AM To 11:30 AM

Max. Marks: 50

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Mention Question Paper Set (P/Q/R/S) on Top of Page.

Answer

Q.1 Choose the correct alternatives from the options.

- 1) Which of the following is not a level of living for a human being?

 - a) Family
 - b) Society
 - c) Individual
 - d) Profession
- 2) What a human being really wants to be, is something that is?

 - a) Pre-conditioned
 - b) Naturally Acceptable
 - c) Based on belief systems
 - d) Temporary
- 3) What is the first priority for a human being?

 - a) Physical facility
 - b) Relationship
 - c) Right Understanding
 - d) Money
- 4) _____ helps the human being to transform from Animal consciousness to human consciousness.

 - a) Physical Facility
 - b) Right understanding
 - c) Relationship
 - d) All of above
- 5) _____ means physical facilities more than to satisfy my needs.

 - a) Health
 - b) Prosperity
 - c) Happiness
 - d) None of above
- 6) Physical facilities are necessary and complete for _____.

 - a) Animal
 - b) Human being
 - c) Nature
 - d) All of the above
- 7) SSSS stands for _____.

 - a) Sadhan Viheen Dukhi Daridra
 - b) Sadhan Sampan Dukhi Daridra
 - c) Sadhan Sampan Sukhi Samridha
 - d) None of the above
- 8) Self and _____ are different in nature, materiality, needs and activities.

 - a) Trust
 - b) Body
 - c) Belief
 - d) None
- 9) Sukh and _____ both are needed and can't replace each other.

 - a) Self
 - b) Body
 - c) Suvidha
 - d) Belief

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- 11) The self is _____ In nature while body is _____ in nature.
- a) Conscious, Physico-chemical b) Unconscious, Physico-chemical
- c) Conscious, Conscious d) None

- 12)** When we assume something about on the prevailing notion is called _____.
 a) Knowing b) Preconditioning
 c) Sensation d) Natural acceptance

- 13)** The requirement of body is nurturing, _____ and right utilization.
- | | |
|------------|----------------|
| a) Desire | b) Protection |
| c) Thought | d) Expectation |

- 14) I being the _____.
a) doer, seer and Enjoyer b) Doer
c) Seer d) Enjoyer

- 15) _____ means one who is cable of taking decisions.
- | | |
|------------|---------|
| a) Doer | b) Seer |
| c) Enjoyer | d) None |

- 16)** The process of education and right living leads to _____ in the individual,
- a) Right understanding b) Health
- c) Prosperity d) None

- 17)** To be assured of others at all time is the feeling of _____.
a) Respect b) Love
c) Trust d) Glory

- 18) _____ Means right evaluation.
a) Respect
c) Trust

- 19)** Acceptance of excellence in others is called _____.
a) Reverence b) Glory
c) Gratitude d) Guidance

- 20)** Saha-Astitwa means _____.
 a) Right understanding b) Trust
 c) Prosperity d) Co-existence

- 21) _____ is the human value which is all-encompassing.
- | | |
|---------|--------------|
| a) Love | b) Glory |
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- 22)** Harmony in the family is the building block for harmony in the _____.
a) Society b) Individual
c) Friend d) Relative

- 23)** Human development essentially means _____.
 a) Transformation from animal consciousness to human consciousness
 b) Earning more and more physical facility
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- 24) Which of the following is the naturally acceptable in relationship?
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- 25) With right understanding, if the other has more understanding, is more responsible than me, then _____.
 a) I am committed to make the other differentiate
 b) I am committed to make the other understand
 c) I am committed to differentiate from the other
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- 26) Which one of the following is not a basic requirement for fulfillment of aspirations of every human being _____.
 a) Right Understanding
 b) Relationship
 c) Physical Facility
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- 27) The naturally acceptable feelings in relationship are _____.
 a) Same for all time
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 d) Sometimes definite sometimes indefinite
- 28) Which of the following does not form an order in nature?
 a) Bio
 b) Animal
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 d) Physical
- 29) All the units of nature can be classified into _____ orders.
 a) Two
 b) Three
 c) Four
 d) Six
- 30) _____ is the foundational value in relationship.
 a) Respect
 b) Love
 c) Trust
 d) Glory
- 31) Correct priority for Physical Facilities; Right Understanding and Relationship.
 a) Physical Facilities, Right Understanding and Relationship
 b) Right Understanding, Relationship and Physical Facilities
 c) Relationship, Right Understanding and Physical Facilities
 d) None of the above
- 32) When we live with correct understanding of values we feel _____.
 a) Deprived
 b) Frustrated
 c) Happy
 d) Unhappy
- 33) We all are differ at the level of our _____ but similar in our _____.
 a) Competence, Intension
 b) Intension, Competence
 c) Competence, Competence
 d) None
- 34) The needs of the self are _____ in time and needs of body are _____.
 a) Discontinuous, Permanent
 b) Continuous, temporary
 c) Happiness, Permanent
 d) None of above

- 35) What are the basic desires of every human being for which they are working?
 a) Physical facilities
 b) Realisation and understanding
 c) Happiness
 d) Continuous happiness and prosperity
- 36) To maintain harmony, we have to work at four levels of living. Identify second level of living.
 a) Self
 b) Family
 c) Society
 d) nature
- 37) Content of self-exploration are _____.
 a) desire and need
 b) program and needs
 c) program and practical
 d) desire and program
- 38) A person who are lack of physical facility stands for _____.
 a) Samadhan viheen dukhi daridra
 b) Sadhan sampanna dukhi daridra
 c) Sadhan Viheen Dukhi Daridra
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- 39) According to quantity, which of the following is true for the orders in nature?
 a) Bio order » physical order » Animal order » Human order
 b) Animal order » Bio order » physical order » Human order
 c) Physical order » Bio order » Animal order » Human order
 d) Physical order » Animal order » Bio order » Human order
- 40) Which of the following statement is not true?
 a) There is interconnectedness in nature
 b) There is recyclability and self-regulation in nature
 c) There is struggle for survival in nature
 d) There is mutual fulfillment in nature
- 41) Value education deals with _____.
 a) What is universally valuable to all of us
 b) What is conducive to our individual and collective of us
 c) Enables to be in harmony with ourselves, other and rest of nature
 d) All of the above
- 42) Self-Exploration demands examination and _____ of our belief again and again.
 a) Validation
 b) Presentation
 c) Demonstration
 d) Representation
- 43) Any course content on value education needs to be _____.
 a) Universal
 b) Rational
 c) Natural
 d) All of above
- 44) _____ is the basic unit of any human society.
 a) Group
 b) Individual
 c) Nature
 d) Society
- 45) Present Education system gives more value to skills _____.
 a) True
 b) False

- 46) Right Understanding and relationships lead to _____.
a) Mutual Happiness b) Mutual Prosperity
c) Both a and b d) None
- 47) Value education should be Natural and verifiable means _____.
a) Intellectual and Informative
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d) None
- 48) Are the content of self-exploration _____.
a) Program b) Desire
c) both a and b d) None
- 49) To be in state of liking is _____.
a) Happy b) Unhappy
c) both a and b d) None of the above
- 50) Which of the following is NOT TRUE?
a) Values vary from person to person
b) Values hold a higher priority in education
c) Values guide the skills
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Seat No.	
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Set **S**

Marks Obtained	
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Signature of Examiner	
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Signature of Junior Supervisor	
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F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024
Universal Human Values (BTN10106)

Day & Date: Saturday, 18-05-2024
 Time: 10:00 AM To 11:30 AM

Max. Marks: 50

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Mention Question Paper Set (P/Q/R/S) on Top of Page.

Answer**Q.1 Choose the correct alternatives from the options.**

- 1) Correct priority for Physical Facilities; Right Understanding and Relationship.
 - a) Physical Facilities, Right Understanding and Relationship
 - b) Right Understanding, Relationship and Physical Facilities
 - c) Relationship, Right Understanding and Physical Facilities
 - d) None of the above

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- 2) When we live with correct understanding of values we feel _____.
 - a) Deprived
 - b) Frustrated
 - c) Happy
 - d) Unhappy

☐
- 3) We all are differ at the level of our _____ but similar in our _____.
 - a) Competence, Intension
 - b) Intension, Competence
 - c) Competence, Competence
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☐
- 4) The needs of the self are _____ in time and needs of body are _____.
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- 5) What are the basic desires of every human being for which they are working?
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☐
- 6) To maintain harmony, we have to work at four levels of living. Identify second level of living.
 - a) Self
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☐
- 7) Content of self-exploration are _____.
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☐

- 8) A person who are lack of physical facility stands for _____.
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- 32) When we assume something about on the prevailing notion is called _____.
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- 33) The requirement of body is nurturing, _____ and right utilization.
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a) Two b) Three
c) Four d) Six
- 50) _____ is the foundational value in relationship.
a) Respect b) Love
c) Trust d) Glory

☐☐☐☐☐☐

- 7) $\left[\sin\left(\frac{\pi}{3}\right) + i \cos\left(\frac{\pi}{3}\right) \right]^4$ is equal to ____.
- a) $\sin\frac{4\pi}{3} + i \cos\frac{4\pi}{3}$ b) $\sin\frac{\pi}{12} + i \cos\frac{\pi}{12}$
 c) $-i \sin\frac{2\pi}{3} + \cos\frac{2\pi}{3}$ d) $\cos\frac{2\pi}{3} + i \sin\frac{2\pi}{3}$
- 8) The beta function $B(m, n)$ converges for ____.
- a) $m \geq -1, n \geq -1$ b) $m > 0, n \geq -2$
 c) $m \geq -1, n > -1$ d) $m > 0, n > 0$
- 9) If $I(a) = \int_0^1 \frac{x^a - 1}{\log x} dx$ then $\frac{dI}{da} =$ ____.
- a) $\frac{1}{a-1}$ b) $\frac{1}{a+1}$
 c) $\frac{-1}{a+1}$ d) $\frac{1}{\log a}$
- 10) The curve $x^3 + y^3 = 3xy$ is symmetrical about ____.
- a) The line $y = x$ b) x -axis
 c) y -axis d) Both axes
- 11) The asymptotes obtained by equating the coefficients of the highest powers of x to zero is ____.
- a) Parallel to the x -axis b) Parallel to the y -axis
 c) The line $y = x$ d) The line $y = -x$
- 12) The value of $\int_0^{\frac{\pi}{2}} \int_0^1 r^3 \sin \theta \cos \theta dr d\theta =$ ____.
- a) $\frac{\pi}{4}$ b) $\frac{\pi}{8}$
 c) $\frac{1}{8}$ d) $\frac{1}{4}$
- 13) For $\int_0^{4a} \int_0^{2\sqrt{ax}} f(x, y) dy dx$ the change of order is ____.
- a) $\int_0^{4a} \int_0^{2\sqrt{ay}} f(x, y) dx dy$ b) $\int_0^{2\sqrt{ax}} \int_0^{4a} f(x, y) dy dx$
 c) $\int_0^{4a} \int_{\frac{y^2}{4a}}^{4a} f(x, y) dx dy$ d) None of these
- 14) If the density at any point varies as the distance of the point from the x -axis, then p is equal to ____.
- a) kx b) kxy
 c) ky d) $k(x^2 + y^2)$

Seat No.	
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Set **P**

**F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination:
March/April-2024**

**Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/
BTCSE0203/ BTEE0203)**

Day & Date: Tuesday, 21-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following questions. 09

- Solve: $(x + 2y - 1)dx = (x + 2y + 1)dy$
- Solve $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + \sin y) dy = 0$
- Find the analytic function whose imaginary part is $v = \cos(x) \cosh(y)$
- Find all the values of $x^4 - x^3 + x^2 - x + 1 = 0$
- Test the convergence of $\sum \frac{n^3+2}{2^{n+2}}$ by using D'Alembert's ratio test.

Q.3 Solve any three of the following questions. 09

- $\frac{dy}{dx} + (2x \tan^{-1} y - x^3)(1 + y^2) = 0$
- Find the orthogonal trajectory of family of curve $y^2 = 4ax$
- Check whether following function is analytic or not. If analytic then find its derivatives, $f(z) = z^2 + z$
- By Cauchy's test examine the convergence of $\sum \left(1 + \frac{1}{n}\right)^{n^2}$
- Determine k such that $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \left(\frac{kx}{y}\right)$ is an analytic function.

Q.4 Solve any two of the following questions. 10

- When a switch is closed, the current built up in an electric circuit is given by $L \frac{di}{dt} + Ri = E$ if $L = 640, R = 250, E = 500$, and $i = 0$ where $t = 0$. Show the current will approach 2 amp. when $t \rightarrow \infty$.
- Define absolute and conditional convergence. Examine the convergence of the series.

$$-\frac{1}{2} + \frac{2}{5} - \frac{3}{10} + \dots + (-1)^n \frac{n}{n^2 + 1} + \dots$$

- Prove that $v = e^x \sin y$ is harmonic function. Find its harmonic conjugate u and the analytic function $f(z)$.

Section – II

Q.5 Attempt any THREE of the following.**09**

- a) Evaluate $\int_0^{\infty} x^7 e^{-2x^2} dx$
- b) Evaluate $\int_2^4 \int_2^x \int_2^{x+y} z dz dy dx$
- c) Evaluate $\iint (x^2 - y^2) dx dy$ over the area of the triangle whose vertices are at $(0, 1), (1, 1), (1, 2)$
- d) Show that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2} dx = \pi\sqrt{a}$
- e) Trace the curve $x = a(t + \sin t), y = a(1 - \cos t)$

Q.6 Attempt any THREE of the following.**09**

- a) Change to polar and evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$
- b) Trace the curve $r = a \cos 3\theta$
- c) Evaluate $\int_0^9 x^{3/2} (9-x)^{1/2} dx$
- d) Find the area included between the curves $y = x^2$ & $y = x^3$
- e) Change the order and evaluate $\int_3^5 \int_0^{\frac{4}{x}} x y dx dy$

Q.7 Solve any TWO the following.**10**

- a) Determine the mass of lamina of the form $\frac{x^2}{4} + \frac{y^2}{9} = 1$, if the density at any point varies as the product of its distances from the axes of the ellipse.
- b) State and Prove duplication formula.
- c) Trace the curve with full justification

$$x^2 y^2 = a^2 (y^2 - x^2)$$

Seat No.	
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Set **Q**

**F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination:
March/April-2024
Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/
BTCSE0203/ BTEE0203)**

Day & Date: Tuesday, 21-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The beta function $B(m, n)$ converges for _____.
 - a) $m \geq -1, n \geq -1$
 - b) $m > 0, n \geq -2$
 - c) $m \geq -1, n > -1$
 - d) $m > 0, n > 0$
- 2) If $I(a) = \int_0^1 \frac{x^a - 1}{\log x} dx$ then $\frac{dI}{da} =$ _____.
 - a) $\frac{1}{a-1}$
 - b) $\frac{1}{a+1}$
 - c) $\frac{-1}{a+1}$
 - d) $\frac{1}{\log a}$
- 3) The curve $x^3 + y^3 = 3xy$ is symmetrical about _____.
 - a) The line $y = x$
 - b) x -axis
 - c) y -axis
 - d) Both axes
- 4) The asymptotes obtained by equating the coefficients of the highest powers of x to zero is _____.
 - a) Parallel to the x -axis
 - b) Parallel to the y -axis
 - c) The line $y = x$
 - d) The line $y = -x$
- 5) The value of $\int_0^{\frac{\pi}{2}} \int_0^1 r^3 \sin \theta \cos \theta dr d\theta =$ _____.
 - a) $\frac{\pi}{4}$
 - b) $\frac{\pi}{8}$
 - c) $\frac{1}{8}$
 - d) $\frac{1}{4}$

6) For $\int_0^{4a} \int_0^{2\sqrt{ax}} f(x, y) dy dx$ the change of order is _____.

- a) $\int_0^{4a} \int_0^{2\sqrt{ay}} f(x, y) dx dy$ b) $\int_0^{2\sqrt{ax}} \int_0^{4a} f(x, y) dy dx$
 c) $\int_0^{4a} \int_{\frac{y^2}{4a}}^{4a} f(x, y) dx dy$ d) None of these

7) If the density at any point varies as the distance of the point from the x -axis, then p is equal to _____.

- a) kx b) kxy
 c) ky d) $k(x^2 + y^2)$

8) The order and the degree of the differential equation

$$\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx} \right)^2 \right]^{3/2} \text{ is } \underline{\hspace{2cm}}.$$

- a) 2, 2 b) 2, 1
 c) 1, 1 d) 3, 1

9) The integrating factor of the D.E. $\frac{dy}{dx} + \frac{2xy}{1+x^2} = 0$ is _____.

- a) e^{-x} b) x
 c) $1 + x^2$ d) $\frac{1}{1+x^2}$

10) The p -series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if _____.

- a) $p \leq 1$ b) $p = 0$
 c) $p > 1$ d) $p = \frac{1}{2}$

11) By D'Alembert's ratio test the series $\sum_n \frac{3^n}{2^{n+3}}$ is _____.

- a) convergent b) divergent
 c) oscillatory d) None of these

12) $\sin ix = \underline{\hspace{2cm}}$.

- a) $\sin hx$ b) $i \sin x$
 c) $-\sin ix$ d) $i \sin hx$

13) The sufficient conditions for $f(z)$ to be analytic is _____.

- a) $u_x = -v_x, u_y = v_y$ b) $u_x = v_y, u_y = -v_x$
 c) $u_x = v_y, u_y = v_x$ d) $u_x = -v_y, u_y = v_x$

14) $\left[\sin\left(\frac{\pi}{3}\right) + i \cos\left(\frac{\pi}{3}\right) \right]^4$ is equal to _____.

- a) $\sin \frac{4\pi}{3} + i \cos \frac{4\pi}{3}$ b) $\sin \frac{\pi}{12} + i \cos \frac{\pi}{12}$
 c) $-i \sin \frac{2\pi}{3} + \cos \frac{2\pi}{3}$ d) $\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3}$

Seat No.	
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Set **Q**

**F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination:
March/April-2024**

**Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/
BTCSE0203/ BTEE0203)**

Day & Date: Tuesday, 21-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following questions. **09**

- Solve: $(x + 2y - 1)dx = (x + 2y + 1)dy$
- Solve $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + \sin y) dy = 0$
- Find the analytic function whose imaginary part is $v = \cos(x) \cosh(y)$
- Find all the values of $x^4 - x^3 + x^2 - x + 1 = 0$
- Test the convergence of $\sum \frac{n^3+2}{2^{n+2}}$ by using D'Alembert's ratio test.

Q.3 Solve any three of the following questions. **09**

- $\frac{dy}{dx} + (2x \tan^{-1} y - x^3)(1 + y^2) = 0$
- Find the orthogonal trajectory of family of curve $y^2 = 4ax$
- Check whether following function is analytic or not. If analytic then find its derivatives, $f(z) = z^2 + z$
- By Cauchy's test examine the convergence of $\sum \left(1 + \frac{1}{n}\right)^{n^2}$
- Determine k such that $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \left(\frac{kx}{y}\right)$ is an analytic function.

Q.4 Solve any two of the following questions. **10**

- When a switch is closed, the current built up in an electric circuit is given by $L \frac{di}{dt} + Ri = E$ if $L = 640, R = 250, E = 500$, and $i = 0$ where $t = 0$. Show the current will approach 2 amp. when $t \rightarrow \infty$.
- Define absolute and conditional convergence. Examine the convergence of the series.

$$-\frac{1}{2} + \frac{2}{5} - \frac{3}{10} + \cdots + (-1)^n \frac{n}{n^2 + 1} + \cdots$$

- Prove that $v = e^x \sin y$ is harmonic function. Find its harmonic conjugate u and the analytic function $f(z)$.

Section – II

Q.5 Attempt any THREE of the following.**09**

- a) Evaluate $\int_0^{\infty} x^7 e^{-2x^2} dx$
- b) Evaluate $\int_2^4 \int_2^x \int_2^{x+y} z dz dy dx$
- c) Evaluate $\iint (x^2 - y^2) dx dy$ over the area of the triangle whose vertices are at $(0, 1), (1, 1), (1, 2)$
- d) Show that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2} dx = \pi\sqrt{a}$
- e) Trace the curve $x = a(t + \sin t), y = a(1 - \cos t)$

Q.6 Attempt any THREE of the following.**09**

- a) Change to polar and evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$
- b) Trace the curve $r = a \cos 3\theta$
- c) Evaluate $\int_0^9 x^{3/2} (9-x)^{1/2} dx$
- d) Find the area included between the curves $y = x^2$ & $y = x^3$
- e) Change the order and evaluate $\int_3^5 \int_0^{\frac{4}{x}} x y dx dy$

Q.7 Solve any TWO the following.**10**

- a) Determine the mass of lamina of the form $\frac{x^2}{4} + \frac{y^2}{9} = 1$, if the density at any point varies as the product of its distances from the axes of the ellipse.
- b) State and Prove duplication formula.
- c) Trace the curve with full justification
 $x^2 y^2 = a^2 (y^2 - x^2)$

Seat
No.Set **R**

**F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination:
March/April-2024
Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/
BTCSE0203/ BTEE0203)**

Day & Date: Tuesday, 21-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The asymptotes obtained by equating the coefficients of the highest powers of x to zero is _____.
 a) Parallel to the x -axis b) Parallel to the y -axis
 c) The line $y = x$ d) The line $y = -x$
- 2) The value of $\int_0^{\frac{\pi}{2}} \int_0^1 r^3 \sin \theta \cos \theta \, dr \, d\theta =$ _____.
 a) $\frac{\pi}{4}$ b) $\frac{\pi}{8}$
 c) $\frac{1}{8}$ d) $\frac{1}{4}$
- 3) For $\int_0^{4a} \int_0^{2\sqrt{ax}} f(x, y) \, dy \, dx$ the change of order is _____.
 a) $\int_0^{4a} \int_0^{2\sqrt{ay}} f(x, y) \, dx \, dy$ b) $\int_0^{2\sqrt{ax}} \int_0^{4a} f(x, y) \, dy \, dx$
 c) $\int_0^{4a} \int_{\frac{y^2}{4a}}^{4a} f(x, y) \, dx \, dy$ d) None of these
- 4) If the density at any point varies as the distance of the point from the x -axis, then p is equal to _____.
 a) kx b) kxy
 c) ky d) $k(x^2 + y^2)$
- 5) The order and the degree of the differential equation $\frac{d^2y}{dx^2} = \left[1 + \left(\frac{dy}{dx} \right)^2 \right]^{3/2}$ is _____.
 a) 2, 2 b) 2, 1
 c) 1, 1 d) 3, 1

- 6) The integrating factor of the D.E. $\frac{dy}{dx} + \frac{2xy}{1+x^2} = 0$ is _____.
 a) e^{-x} b) x
 c) $1 + x^2$ d) $\frac{1}{1+x^2}$
- 7) The p -series $\sum_{n=1}^{\infty} \frac{1}{n^p}$ is convergent if _____.
 a) $p \leq 1$ b) $p = 0$
 c) $p > 1$ d) $p = \frac{1}{2}$
- 8) By D'Alembert's ratio test the series $\sum_n \frac{3^n}{2^{n+3}}$ is _____.
 a) convergent b) divergent
 c) oscillatory d) None of these
- 9) $\sin ix =$ _____.
 a) $\sin hx$ b) $i \sin x$
 c) $-\sin ix$ d) $i \sin hx$
- 10) The sufficient conditions for $f(z)$ to be analytic is _____.
 a) $u_x = -v_x, u_y = v_y$ b) $u_x = v_y, u_y = -v_x$
 c) $u_x = v_y, u_y = v_x$ d) $u_x = -v_y, u_y = v_x$
- 11) $\left[\sin\left(\frac{\pi}{3}\right) + i \cos\left(\frac{\pi}{3}\right) \right]^4$ is equal to _____.
 a) $\sin \frac{4\pi}{3} + i \cos \frac{4\pi}{3}$ b) $\sin \frac{\pi}{12} + i \cos \frac{\pi}{12}$
 c) $-i \sin \frac{2\pi}{3} + \cos \frac{2\pi}{3}$ d) $\cos \frac{2\pi}{3} + i \sin \frac{2\pi}{3}$
- 12) The beta function $B(m, n)$ converges for _____.
 a) $m \geq -1, n \geq -1$ b) $m > 0, n \geq -2$
 c) $m \geq -1, n > -1$ d) $m > 0, n > 0$
- 13) If $I(a) = \int_0^1 \frac{x^a - 1}{\log x} dx$ then $\frac{dI}{da} =$ _____.
 a) $\frac{1}{a-1}$ b) $\frac{1}{a+1}$
 c) $\frac{-1}{a+1}$ d) $\frac{1}{\log a}$
- 14) The curve $x^3 + y^3 = 3xy$ is symmetrical about _____.
 a) The line $y = x$ b) x -axis
 c) y -axis d) Both axes

Seat No.	
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Set **R**

**F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination:
March/April-2024**

**Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/
BTCSE0203/ BTEE0203)**

Day & Date: Tuesday, 21-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following questions.

09

- Solve: $(x + 2y - 1)dx = (x + 2y + 1)dy$
- Solve $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + \sin y) dy = 0$
- Find the analytic function whose imaginary part is $v = \cos(x) \cosh(y)$
- Find all the values of $x^4 - x^3 + x^2 - x + 1 = 0$
- Test the convergence of $\sum \frac{n^3+2}{2^{n+2}}$ by using D'Alembert's ratio test.

Q.3 Solve any three of the following questions.

09

- $\frac{dy}{dx} + (2x \tan^{-1} y - x^3)(1 + y^2) = 0$
- Find the orthogonal trajectory of family of curve $y^2 = 4ax$
- Check whether following function is analytic or not. If analytic then find its derivatives, $f(z) = z^2 + z$
- By Cauchy's test examine the convergence of $\sum \left(1 + \frac{1}{n}\right)^{n^2}$
- Determine k such that $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \left(\frac{kx}{y}\right)$ is an analytic function.

Q.4 Solve any two of the following questions.

10

- When a switch is closed, the current built up in an electric circuit is given by $L \frac{di}{dt} + Ri = E$ if $L = 640, R = 250, E = 500$, and $i = 0$ where $t = 0$. Show the current will approach 2 amp. when $t \rightarrow \infty$.
- Define absolute and conditional convergence. Examine the convergence of the series.

$$-\frac{1}{2} + \frac{2}{5} - \frac{3}{10} + \dots + (-1)^n \frac{n}{n^2 + 1} + \dots$$

- Prove that $v = e^x \sin y$ is harmonic function. Find its harmonic conjugate u and the analytic function $f(z)$.

Section – II

Q.5 Attempt any THREE of the following.**09**

- a) Evaluate $\int_0^{\infty} x^7 e^{-2x^2} dx$
- b) Evaluate $\int_2^4 \int_2^x \int_2^{x+y} z dz dy dx$
- c) Evaluate $\iint (x^2 - y^2) dx dy$ over the area of the triangle whose vertices are at $(0, 1), (1, 1), (1, 2)$
- d) Show that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2} dx = \pi\sqrt{a}$
- e) Trace the curve $x = a(t + \sin t), y = a(1 - \cos t)$

Q.6 Attempt any THREE of the following.**09**

- a) Change to polar and evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$
- b) Trace the curve $r = a \cos 3\theta$
- c) Evaluate $\int_0^9 x^{3/2} (9-x)^{1/2} dx$
- d) Find the area included between the curves $y = x^2$ & $y = x^3$
- e) Change the order and evaluate $\int_3^5 \int_0^{\frac{4}{x}} x y dx dy$

Q.7 Solve any TWO the following.**10**

- a) Determine the mass of lamina of the form $\frac{x^2}{4} + \frac{y^2}{9} = 1$, if the density at any point varies as the product of its distances from the axes of the ellipse.
- b) State and Prove duplication formula.
- c) Trace the curve with full justification

$$x^2 y^2 = a^2 (y^2 - x^2)$$

Seat No.	
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**F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination:
March/April-2024
Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/
BTCSE0203/ BTEE0203)**

Day & Date: Tuesday, 21-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The sufficient conditions for $f(z)$ to be analytic is _____.
 a) $u_x = -v_x, u_y = v_y$ b) $u_x = v_y, u_y = -v_x$
 c) $u_x = v_y, u_y = v_x$ d) $u_x = -v_y, u_y = v_x$
- 2) $\left[\sin\left(\frac{\pi}{3}\right) + i \cos\left(\frac{\pi}{3}\right) \right]^4$ is equal to _____.
 a) $\sin\frac{4\pi}{3} + i \cos\frac{4\pi}{3}$ b) $\sin\frac{\pi}{12} + i \cos\frac{\pi}{12}$
 c) $-i \sin\frac{2\pi}{3} + \cos\frac{2\pi}{3}$ d) $\cos\frac{2\pi}{3} + i \sin\frac{2\pi}{3}$
- 3) The beta function $B(m, n)$ converges for _____.
 a) $m \geq -1, n \geq -1$ b) $m > 0, n \geq -2$
 c) $m \geq -1, n > -1$ d) $m > 0, n > 0$
- 4) If $I(a) = \int_0^1 \frac{x^a - 1}{\log x} dx$ then $\frac{dI}{da} =$ _____.
 a) $\frac{1}{a-1}$ b) $\frac{1}{a+1}$
 c) $\frac{-1}{a+1}$ d) $\frac{1}{\log a}$
- 5) The curve $x^3 + y^3 = 3xy$ is symmetrical about _____.
 a) The line $y = x$ b) x -axis
 c) y -axis d) Both axes
- 6) The asymptotes obtained by equating the coefficients of the highest powers of x to zero is _____.
 a) Parallel to the x -axis b) Parallel to the y -axis
 c) The line $y = x$ d) The line $y = -x$

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Seat No.	
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Set **S**

**F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination:
March/April-2024
Engineering Mathematics – II (BTCE0203/ BTME0203/ BTETE0203/
BTCSE0203/ BTEE0203)**

Day & Date: Tuesday, 21-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any three of the following questions. 09

- Solve: $(x + 2y - 1)dx = (x + 2y + 1)dy$
- Solve $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + \sin y) dy = 0$
- Find the analytic function whose imaginary part is $v = \cos(x) \cosh(y)$
- Find all the values of $x^4 - x^3 + x^2 - x + 1 = 0$
- Test the convergence of $\sum \frac{n^3+2}{2^{n+2}}$ by using D'Alembert's ratio test.

Q.3 Solve any three of the following questions. 09

- $\frac{dy}{dx} + (2x \tan^{-1} y - x^3)(1 + y^2) = 0$
- Find the orthogonal trajectory of family of curve $y^2 = 4ax$
- Check whether following function is analytic or not. If analytic then find its derivatives, $f(z) = z^2 + z$
- By Cauchy's test examine the convergence of $\sum \left(1 + \frac{1}{n}\right)^{n^2}$
- Determine k such that $f(z) = \frac{1}{2} \log(x^2 + y^2) + i \tan^{-1} \left(\frac{kx}{y}\right)$ is an analytic function.

Q.4 Solve any two of the following questions. 10

- When a switch is closed, the current built up in an electric circuit is given by $L \frac{di}{dt} + Ri = E$ if $L = 640, R = 250, E = 500$, and $i = 0$ where $t = 0$. Show the current will approach 2 amp. when $t \rightarrow \infty$.
- Define absolute and conditional convergence. Examine the convergence of the series.

$$-\frac{1}{2} + \frac{2}{5} - \frac{3}{10} + \dots + (-1)^n \frac{n}{n^2 + 1} + \dots$$

- Prove that $v = e^x \sin y$ is harmonic function. Find its harmonic conjugate u and the analytic function $f(z)$.

Section – II

Q.5 Attempt any THREE of the following.**09**

- a) Evaluate $\int_0^{\infty} x^7 e^{-2x^2} dx$
- b) Evaluate $\int_2^4 \int_2^x \int_2^{x+y} z dz dy dx$
- c) Evaluate $\iint (x^2 - y^2) dx dy$ over the area of the triangle whose vertices are at $(0, 1), (1, 1), (1, 2)$
- d) Show that $\int_0^{\infty} \frac{\log(1+ax^2)}{x^2} dx = \pi\sqrt{a}$
- e) Trace the curve $x = a(t + \sin t), y = a(1 - \cos t)$

Q.6 Attempt any THREE of the following.**09**

- a) Change to polar and evaluate $\int_0^{\infty} \int_0^{\infty} e^{-(x^2+y^2)} dx dy$
- b) Trace the curve $r = a \cos 3\theta$
- c) Evaluate $\int_0^9 x^{3/2} (9-x)^{1/2} dx$
- d) Find the area included between the curves $y = x^2$ & $y = x^3$
- e) Change the order and evaluate $\int_3^5 \int_0^{\frac{4}{x}} x y dx dy$

Q.7 Solve any TWO the following.**10**

- a) Determine the mass of lamina of the form $\frac{x^2}{4} + \frac{y^2}{9} = 1$, if the density at any point varies as the product of its distances from the axes of the ellipse.
- b) State and Prove duplication formula.
- c) Trace the curve with full justification

$$x^2 y^2 = a^2 (y^2 - x^2)$$

**Seat
No.**

Set	P
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Day & Date: Saturday, 25-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) In N type semiconductor majority charge carrier's are _____.
a) protons b) electrons
c) neutrons d) positive holes
- 2) Acceptor type of semiconductor is formed by adding impurity of valency _____.
a) 3 b) 4
c) 5 d) 6
- 3) Co-ordination number for BCC is _____.
a) 4 b) 6
c) 8 d) 12
- 4) The packing fraction of FCC is _____.
a) 0.52 b) 0.74
c) 0.68 d) 0.48
- 5) Optimum reverberation time for formusicis _____.
a) 0.5 to 1 sec b) 0 to 1 sec
c) 1 to 2 sec d) above 5 sec
- 6) The absorption coefficient is measured in _____.
a) WOU b) OWU
c) m/s² d) s²
- 7) The condition for Bragg's diffraction is _____.
a) $d\sin \theta = n\lambda$ b) $2\lambda\sin \theta = nd$
c) $2n\sin \theta = d\lambda$ d) $2d\sin \theta = n\lambda$
- 8) Light waves are transverse in nature, can be demonstrated by observing the phenomenon of _____.
a) polarization b) diffraction
c) dispersion d) interference

- 9) The bending of light around the edges of an obstacle is known as _____.
 - a) Scattering
 - b) Polarization
 - c) Diffraction
 - d) Dispersion
- 10) Emission of a photon by an atom without an external stimulus is called _____.
 - a) stimulated emission
 - b) induced emission
 - c) amplified emission
 - d) spontaneous emission
- 11) Stimulated emission process is mathematically represented by equation.
 - a) $A + h\nu \rightarrow A^*$
 - b) $A^* + h\nu \rightarrow A + 2h\nu$
 - c) $A^* \rightarrow A + h\nu$
 - d) $A^* + h\nu \rightarrow A + h\nu$
- 12) The hologram records _____ of the object.
 - a) Both intensity variation and phase distribution
 - b) Only intensity variation
 - c) Only phase distribution
 - d) None
- 13) Basic principle of optical fiber is _____.
 - a) total internal refraction
 - b) Refraction
 - c) Reflection
 - d) total internal reflection
- 14) The chirality of Armchair CNT is _____.
 - a) (a, a)
 - b) (a, b)
 - c) (0, b)
 - d) (a, 0)

Seat No.	
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F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics
(BTCE0201/ BTME0201/ BTETE0201/BTCSE0201/ BTEE0201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Make suitable assumptions, if necessary.

Section – I

Q.2 Attempt any SIX of the following.

18

- a) Define the terms
 - i) Space lattice
 - ii) Unit Cell
 - iii) Atomic Radius
- b) Represent positions of Fermi level in intrinsic, P-type and N-type semiconductor
- c) Classify solids on basis of band theory (Conductor, Semiconductor, Insulator)
- d) Calculate Atomic packing fraction for SC and BCC structure
- e) Explain: Sabine's formula with the terms involved in it.
- f) State: Properties of ultrasonic waves.
- g) An N type germanium sample has a donor density of $10^{21}/\text{m}^3$. It is arranged in a Hall experiment having magnetic field of 0.5T and the current density is $500\text{A}/\text{m}^2$. Find the Hall voltage if the sample is 3mm wide.
- h) Polonium belongs to SC lattice. If the lattice constant is 3.36 \AA . Calculate its density. The atomic weight of polonium is 209.

Q.3 Attempt any TWO of the following:

10

- a) State Hall Effect. Derive an expression for Hall voltage.
- b) Define Miller Indices. Prove that interplanar distance for cubic lattice is given by $d_{hkl} = \frac{a}{\sqrt{h^2+k^2+l^2}}$
- c) Explain factors affecting acoustics of auditorium and their remedies.
- d) Solve following Problems
 - i) Determine the miller indices for planes in each of the following sets
 - 1) $3a, 3b, 2c$
 - 2) $a, 2b, c$
 - 3) $a, b/2, c$
 - ii) A classroom has dimensions $20 \times 15 \times 5 \text{ m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surface and the average absorption coefficient?

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Explain: Positive and negative crystals.
- c) Explain
 - i) Population Inversion and
 - ii) Stimulated Absorption
- d) State properties of LASER.
- e) Explain types of optical fiber with diagram.
- f) Write applications of nanotechnology in various fields.
- g) What is the highest order spectrum which may be seen with monochromatic light of wavelength 6000 AU by means of diffraction grating with 5000 lines per cm.
- h) The numerical aperture of an optical fibre is 0.5 and the core refractive index is 1.5. Find refractive index of the cladding.

Q.5 Attempt any TWO of the following.**10**

- a) What is diffraction grating? Derive an expression for the resolving power of a diffraction grating ($\lambda/d\lambda = n.N$).
- b) Explain: He-Ne gas laser with neat energy and transition diagram.
- c) Obtain the expression for acceptance angle, hence define acceptance cone angle
- d)
 - i) A 20cm long glass tube containing sugar solution rotates the plane of polarization by 11° . If the specific rotation of sugar is 66° , calculate the strength of the solution.
 - ii) In a step index optical fiber, core index $n_1=1.55$ and cladding index $n_2=1.40$ find
 - 1) NA
 - 2) Δ and
 - 3) Acceptance angle

**Seat
No.**

Set Q

Day & Date: Saturday, 25-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Light waves are transverse in nature, can be demonstrated by observing the phenomenon of _____.
a) polarization
b) diffraction
c) dispersion
d) interference
- 2) The bending of light around the edges of an obstacle is known as _____.
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b) Polarization
c) Diffraction
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- 3) Emission of a photon by an atom without an external stimulus is called _____.
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b) induced emission
c) amplified emission
d) spontaneous emission
- 4) Stimulated emission process is mathematically represented by equation.
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c) $A^* \rightarrow A + h\nu$
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- 5) The hologram records _____ of the object.
a) Both intensity variation and phase distribution
b) Only intensity variation
c) Only phase distribution
d) None
- 6) Basic principle of optical fiber is _____.
a) total internal refraction
b) Refraction
c) Reflection
d) total internal reflection
- 7) The chirality of Armchair CNT is _____.
a) (a, a)
b) (a, b)
c) (0, b)
d) (a, 0)

- 8) In N type semiconductor majority charge carrier's are _____.
a) protons b) electrons
c) neutrons d) positive holes
- 9) Acceptor type of semiconductor is formed by adding impurity of valency _____.
a) 3 b) 4
c) 5 d) 6
- 10) Co-ordination number for BCC is _____.
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- 11) The packing fraction of FCC is _____.
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c) 0.68 d) 0.48
- 12) Optimum reverberation time for formusicis _____.
a) 0.5 to 1 sec b) 0 to 1 sec
c) 1 to 2 sec d) above 5 sec
- 13) The absorption coefficient is measured in _____.
a) WOU b) OWU
c) m/s² d) s²
- 14) The condition for Bragg's diffraction is _____.
a) $d\sin \theta = n\lambda$ b) $2\lambda\sin \theta = nd$
c) $2n\sin \theta = d\lambda$ d) $2d\sin \theta = n\lambda$

Seat No.	
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F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics
(BTCE0201/ BTME0201/ BTETE0201/BTCSE0201/ BTEE0201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Make suitable assumptions, if necessary.

Section – I

Q.2 Attempt any SIX of the following.

18

- a) Define the terms
 - i) Space lattice
 - ii) Unit Cell
 - iii) Atomic Radius
- b) Represent positions of Fermi level in intrinsic, P-type and N-type semiconductor
- c) Classify solids on basis of band theory (Conductor, Semiconductor, Insulator)
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- e) Explain: Sabine's formula with the terms involved in it.
- f) State: Properties of ultrasonic waves.
- g) An N type germanium sample has a donor density of $10^{21}/\text{m}^3$. It is arranged in a Hall experiment having magnetic field of 0.5T and the current density is $500\text{A}/\text{m}^2$. Find the Hall voltage if the sample is 3mm wide.
- h) Polonium belongs to SC lattice. If the lattice constant is 3.36 \AA . Calculate its density. The atomic weight of polonium is 209.

Q.3 Attempt any TWO of the following:

10

- a) State Hall Effect. Derive an expression for Hall voltage.
- b) Define Miller Indices. Prove that interplanar distance for cubic lattice is given by $d_{hkl} = \frac{a}{\sqrt{h^2+k^2+l^2}}$
- c) Explain factors affecting acoustics of auditorium and their remedies.
- d) Solve following Problems
 - i) Determine the miller indices for planes in each of the following sets
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 - 2) $a, 2b, c$
 - 3) $a, b/2, c$
 - ii) A classroom has dimensions $20 \times 15 \times 5 \text{ m}^3$. The reverberation time is 3.5 sec. Calculate the total absorption of its surface and the average absorption coefficient?

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Explain: Positive and negative crystals.
- c) Explain
 - i) Population Inversion and
 - ii) Stimulated Absorption
- d) State properties of LASER.
- e) Explain types of optical fiber with diagram.
- f) Write applications of nanotechnology in various fields.
- g) What is the highest order spectrum which may be seen with monochromatic light of wavelength 6000 AU by means of diffraction grating with 5000 lines per cm.
- h) The numerical aperture of an optical fibre is 0.5 and the core refractive index is 1.5. Find refractive index of the cladding.

Q.5 Attempt any TWO of the following.**10**

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- b) Explain: He-Ne gas laser with neat energy and transition diagram.
- c) Obtain the expression for acceptance angle, hence define acceptance cone angle
- d)
 - i) A 20cm long glass tube containing sugar solution rotates the plane of polarization by 11° . If the specific rotation of sugar is 66° , calculate the strength of the solution.
 - ii) In a step index optical fiber, core index $n_1=1.55$ and cladding index $n_2=1.40$ find
 - 1) NA
 - 2) Δ and
 - 3) Acceptance angle

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics
(BTCE0201/ BTME0201/ BTETE0201/BTCSE0201/ BTEE0201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicate full marks.
 4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Stimulated emission process is mathematically represented by equation.

a) $A + h\gamma \rightarrow A^*$	b) $A^* + h\gamma \rightarrow A + 2h\gamma$
c) $A^* \rightarrow A + h\gamma$	d) $A^* + h\gamma \rightarrow A + h\gamma$
- 2) The hologram records _____ of the object.
 - a) Both intensity variation and phase distribution
 - b) Only intensity variation
 - c) Only phase distribution
 - d) None
- 3) Basic principle of optical fiber is _____.

a) total internal refraction	b) Refraction
c) Reflection	d) total internal reflection
- 4) The chirality of Armchair CNT is _____.

a) (a, a)	b) (a, b)
c) (0, b)	d) (a, 0)
- 5) In N type semiconductor majority charge carrier's are _____.

a) protons	b) electrons
c) neutrons	d) positive holes
- 6) Acceptor type of semiconductor is formed by adding impurity of valency _____.

a) 3	b) 4
c) 5	d) 6
- 7) Co-ordination number for BCC is _____.

a) 4	b) 6
c) 8	d) 12

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics
(BTCE0201/ BTME0201/ BTETE0201/BTCSE0201/ BTEE0201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Make suitable assumptions, if necessary.

Section – I**Q.2 Attempt any SIX of the following.****18**

- Define the terms
 - Space lattice
 - Unit Cell
 - Atomic Radius
- Represent positions of Fermi level in intrinsic, P-type and N-type semiconductor
- Classify solids on basis of band theory (Conductor, Semiconductor, Insulator)
- Calculate Atomic packing fraction for SC and BCC structure
- Explain: Sabine's formula with the terms involved in it.
- State: Properties of ultrasonic waves.
- An N type germanium sample has a donor density of $10^{21}/\text{m}^3$. It is arranged in a Hall experiment having magnetic field of 0.5T and the current density is $500\text{A}/\text{m}^2$. Find the Hall voltage if the sample is 3mm wide.
- Polonium belongs to SC lattice. If the lattice constant is 3.36 Å. Calculate its density. The atomic weight of polonium is 209.

Q.3 Attempt any TWO of the following:**10**

- State Hall Effect. Derive an expression for Hall voltage.
- Define Miller Indices. Prove that interplanar distance for cubic lattice is given by $d_{hkl} = \frac{a}{\sqrt{h^2+k^2+l^2}}$
- Explain factors affecting acoustics of auditorium and their remedies.
- Solve following Problems
 - Determine the miller indices for planes in each of the following sets
 - 3a,3b,2c
 - a,2b, c
 - a, b/2, c
 - A classroom has dimensions 20 x 15x 5 m³. The reverberation time is 3.5 sec. Calculate the total absorption of its surface and the average absorption coefficient?

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Explain: Positive and negative crystals.
- c) Explain
 - i) Population Inversion and
 - ii) Stimulated Absorption
- d) State properties of LASER.
- e) Explain types of optical fiber with diagram.
- f) Write applications of nanotechnology in various fields.
- g) What is the highest order spectrum which may be seen with monochromatic light of wavelength 6000 AU by means of diffraction grating with 5000 lines per cm.
- h) The numerical aperture of an optical fibre is 0.5 and the core refractive index is 1.5. Find refractive index of the cladding.

Q.5 Attempt any TWO of the following.**10**

- a) What is diffraction grating? Derive an expression for the resolving power of a diffraction grating ($\lambda/d\lambda = n.N$).
- b) Explain: He-Ne gas laser with neat energy and transition diagram.
- c) Obtain the expression for acceptance angle, hence define acceptance cone angle
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 - i) A 20cm long glass tube containing sugar solution rotates the plane of polarization by 11° . If the specific rotation of sugar is 66° , calculate the strength of the solution.
 - ii) In a step index optical fiber, core index $n_1=1.55$ and cladding index $n_2=1.40$ find
 - 1) NA
 - 2) Δ and
 - 3) Acceptance angle

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics
(BTCE0201/ BTME0201/ BTETE0201/BTCSE0201/ BTEE0201)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicate full marks.
- 4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The absorption coefficient is measured in _____.
a) WOU b) OWU
c) m/s^2 d) s^2
- 2) The condition for Bragg's diffraction is _____.
a) $d \sin \theta = n\lambda$ b) $2\lambda \sin \theta = nd$
c) $2n \sin \theta = d\lambda$ d) $2d \sin \theta = n\lambda$
- 3) Light waves are transverse in nature, can be demonstrated by observing the phenomenon of _____.
a) polarization b) diffraction
c) dispersion d) interference
- 4) The bending of light around the edges of an obstacle is known as _____.
a) Scattering b) Polarization
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- 5) Emission of a photon by an atom without an external stimulus is called _____.
a) stimulated emission b) induced emission
c) amplified emission d) spontaneous emission
- 6) Stimulated emission process is mathematically represented by equation.
a) $A + h\nu \rightarrow A^*$ b) $A^* + h\nu \rightarrow A + 2h\nu$
c) $A^* \rightarrow A + h\nu$ d) $A^* + h\nu \rightarrow A + h\nu$
- 7) The hologram records _____ of the object.
a) Both intensity variation and phase distribution
b) Only intensity variation
c) Only phase distribution
d) None

- 8) Basic principle of optical fiber is _____.
a) total internal refraction b) Refraction
c) Reflection d) total internal reflection
- 9) The chirality of Armchair CNT is _____.
a) (a, a) b) (a, b)
c) (0, b) d) (a, 0)
- 10) In N type semiconductor majority charge carrier's are _____.
a) protons b) electrons
c) neutrons d) positive holes
- 11) Acceptor type of semiconductor is formed by adding impurity of valency _____.
a) 3 b) 4
c) 5 d) 6
- 12) Co-ordination number for BCC is _____.
a) 4 b) 6
c) 8 d) 12
- 13) The packing fraction of FCC is _____.
a) 0.52 b) 0.74
c) 0.68 d) 0.48
- 14) Optimum reverberation time for formusicis _____.
a) 0.5 to 1 sec b) 0 to 1 sec
c) 1 to 2 sec d) above 5 sec

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Physics
(BTCE0201/ BTME0201/ BTETE0201/BTCSE0201/ BTEE0201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Make suitable assumptions, if necessary.

Section – I**Q.2 Attempt any SIX of the following.****18**

- a) Define the terms
 - i) Space lattice
 - ii) Unit Cell
 - iii) Atomic Radius
- b) Represent positions of Fermi level in intrinsic, P-type and N-type semiconductor
- c) Classify solids on basis of band theory (Conductor, Semiconductor, Insulator)
- d) Calculate Atomic packing fraction for SC and BCC structure
- e) Explain: Sabine's formula with the terms involved in it.
- f) State: Properties of ultrasonic waves.
- g) An N type germanium sample has a donor density of $10^{21}/\text{m}^3$. It is arranged in a Hall experiment having magnetic field of 0.5T and the current density is $500\text{A}/\text{m}^2$. Find the Hall voltage if the sample is 3mm wide.
- h) Polonium belongs to SC lattice. If the lattice constant is 3.36 Å. Calculate its density. The atomic weight of polonium is 209.

Q.3 Attempt any TWO of the following:**10**

- a) State Hall Effect. Derive an expression for Hall voltage.
- b) Define Miller Indices. Prove that interplanar distance for cubic lattice is given by $d_{hkl} = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$
- c) Explain factors affecting acoustics of auditorium and their remedies.
- d) Solve following Problems
 - i) Determine the miller indices for planes in each of the following sets
 - 1) 3a, 3b, 2c
 - 2) a, 2b, c
 - 3) a, b/2, c
 - ii) A classroom has dimensions 20 x 15x 5 m³. The reverberation time is 3.5 sec. Calculate the total absorption of its surface and the average absorption coefficient?

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain: Rayleigh's criterion of resolution.
- b) Explain: Positive and negative crystals.
- c) Explain
 - i) Population Inversion and
 - ii) Stimulated Absorption
- d) State properties of LASER.
- e) Explain types of optical fiber with diagram.
- f) Write applications of nanotechnology in various fields.
- g) What is the highest order spectrum which may be seen with monochromatic light of wavelength 6000 AU by means of diffraction grating with 5000 lines per cm.
- h) The numerical aperture of an optical fibre is 0.5 and the core refractive index is 1.5. Find refractive index of the cladding.

Q.5 Attempt any TWO of the following.**10**

- a) What is diffraction grating? Derive an expression for the resolving power of a diffraction grating ($\lambda/d\lambda = n.N$).
- b) Explain: He-Ne gas laser with neat energy and transition diagram.
- c) Obtain the expression for acceptance angle, hence define acceptance cone angle
- d)
 - i) A 20cm long glass tube containing sugar solution rotates the plane of polarization by 11° . If the specific rotation of sugar is 66° , calculate the strength of the solution.
 - ii) In a step index optical fiber, core index $n_1=1.55$ and cladding index $n_2=1.40$ find
 - 1) NA
 - 2) Δ and
 - 3) Acceptance angle

Seat No.	
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F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Permanent hardness in water is caused by the presence of:
 - a) calcium chloride
 - b) magnesium sulphate
 - c) both a and b
 - d) CaCO_3
- 2) A semipermeable membrane allows the flow of:
 - a) solvent molecules
 - b) solute molecules
 - c) both solute and solvent molecules
 - d) neither solute nor solvent molecules
- 3) Water is hard when it contains _____.
 - a) acid solution
 - b) precipitate in suspension
 - c) dissolved sodium salts
 - d) dissolved Ca and Mg salts
- 4) A lubricant should possess high _____.
 - a) volatility
 - b) acidity
 - c) oiliness
 - d) none of these
- 5) When graphite is dispersed in oil, it is called _____.
 - a) greases
 - b) aquadag
 - c) oildag
 - d) blended oil
- 6) The rate of corrosion of iron in atmosphere depends upon:
 - a) The humidity of the atmosphere
 - b) The degree of pollution of the atmosphere
 - c) The frequency of rainfall
 - d) all of these factors
- 7) Galvanizing is the process of coating iron with:
 - a) Sn
 - b) Zn
 - c) Cu
 - d) Ni
- 8) A good fuel should possess:
 - a) low calorific value
 - b) high ignition temperature
 - c) high calorific value
 - d) high ash content

- 9) In bomb calorimeter the ignition of fuel is made with the help of _____.
a) Cu fuse wire b) Mg fuse wire
c) Al fuse wire d) Zn fuse wire
- 10) Which of the following is an example of polymer by addition polymerization?
a) Nylon6,6 b) Bakelite
c) Polythene d) BUNA-S rubber
- 11) A plastic which can be softened on heating and hardened on cooling is called:
a) thermo-elastic b) thermoplastic
c) thermosetting d) thermite
- 12) Natural rubber is basically a polymer of:
a) isoprene b) propylene
c) ethylene d) propane
- 13) Which of the following can be used for purification of substances?
a) IR spectroscopy b) UV spectroscopy
c) Gas chromatography d) Calorimetry
- 14) Number of gram equivalents of solute present in a liter of solution is called:
a) Normality b) Molarity
c) Molality d) Mole fraction

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	20.15	162
Mg(HCO ₃) ₂	18.73	146
CaSO ₄	17.00	136
MgCl ₂	16.5	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Explain Ion exchange process for softening of hard water.
 c) Define aeration. Explain different type of aerators.
 d) Define following terms
 i) Aniline point
 ii) Viscosity index
 iii) Flash point
 iv) Cloud point
 e) Define alloy. Explain purpose of alloying.
 f) Explain hydrogen evolution mechanism and oxygen absorption mechanisms.

Q.3 Attempt any Four:

12

- a) Define BOD. How it is determined. Explain its importance.
 b) Define disinfection. Explain disinfection of water by chlorine.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) In acid value determination of lubricating oil 9 gm of oil sample required 6.9 ml of N/10 KOH solution calculate its acid value.
 e) Write a note on galvanizing
 f) Define paint. Give characteristics of good paints.

Section – II

Q.4 Attempt any Four:

16

- a) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of fuel burnt	= 1.5g
Weight of water taken	= 2300g
Water equivalent of bomb and calorimet	= 700 g
Rise in temperature	= 3.15°C
Cooling correction	= 0.05°C
Fuse wire correction	= 10 cal.
Acid correction	= 50 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587cal/g)

- b) Explain construction and working of Boy's calorimeter.
c) Compare solid and liquid fuels.
d) Explain vulcanization of natural rubber. List advantages of vulcanization of rubber.
e) Explain molding of plastics in to articles by following methods.
i) Compression molding
ii) Injection molding
f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:

12

- a) Explain characteristics of batteries.
b) Define Fuel. Explain classification of fuels.
c) Summarize advantages and disadvantages of biodiesel.
d) Explain synthesis, properties and applications of Buna-s
e) The molecular wt. of polystyrene is 20800. Find its degree of polymerization (Mol. Wt. of styrene=104).
f) Calculate the weight of $MgCl_2$ required to prepare 500 ml of 0.6M solutions. (Mol.Wt. of $MgCl_2$ =95)

Seat No.	
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F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) A good fuel should possess:

a) low calorific value	b) high ignition temperature
c) high calorific value	d) high ash content
- 2) In bomb calorimeter the ignition of fuel is made with the help of _____.

a) Cu fuse wire	b) Mg fuse wire
c) Al fuse wire	d) Zn fuse wire
- 3) Which of the following is an example of polymer by addition polymerization?

a) Nylon6,6	b) Bakelite
c) Polythene	d) BUNA-S rubber
- 4) A plastic which can be softened on heating and hardened on cooling is called:

a) thermo-elastic	b) thermoplastic
c) thermosetting	d) thermite
- 5) Natural rubber is basically a polymer of:

a) isoprene	b) propylene
c) ethylene	d) propane
- 6) Which of the following can be used for purification of substances?

a) IR spectroscopy	b) UV spectroscopy
c) Gas chromatography	d) Calorimetry
- 7) Number of gram equivalents of solute present in a liter of solution is called:

a) Normality	b) Molarity
c) Molality	d) Mole fraction
- 8) Permanent hardness in water is caused by the presence of:

a) calcium chloride	b) magnesium sulphate
c) both a and b	d) CaCO ₃

- 9) A semipermeable membrane allows the flow of:
 - a) solvent molecules
 - b) solute molecules
 - c) both solute and solvent molecules
 - d) neither solute nor solvent molecules
- 10) Water is hard when it contains _____.
 - a) acid solution
 - b) precipitate in suspension
 - c) dissolved sodium salts
 - d) dissolved Ca and Mg salts
- 11) A lubricant should possess high _____.
 - a) volatility
 - b) acidity
 - c) oiliness
 - d) none of these
- 12) When graphite is dispersed in oil, it is called _____.
 - a) greases
 - b) aquadag
 - c) oildag
 - d) blended oil
- 13) The rate of corrosion of iron in atmosphere depends upon:
 - a) The humidity of the atmosphere
 - b) The degree of pollution of the atmosphere
 - c) The frequency of rainfall
 - d) all of these factors
- 14) Galvanizing is the process of coating iron with:
 - a) Sn
 - b) Zn
 - c) Cu
 - d) Ni

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	20.15	162
Mg(HCO ₃) ₂	18.73	146
CaSO ₄	17.00	136
MgCl ₂	16.5	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Explain Ion exchange process for softening of hard water.
 c) Define aeration. Explain different type of aerators.
 d) Define following terms
 i) Aniline point
 ii) Viscosity index
 iii) Flash point
 iv) Cloud point
 e) Define alloy. Explain purpose of alloying.
 f) Explain hydrogen evolution mechanism and oxygen absorption mechanisms.

Q.3 Attempt any Four:

12

- a) Define BOD. How it is determined. Explain its importance.
 b) Define disinfection. Explain disinfection of water by chlorine.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) In acid value determination of lubricating oil 9 gm of oil sample required 6.9 ml of N/10 KOH solution calculate its acid value.
 e) Write a note on galvanizing
 f) Define paint. Give characteristics of good paints.

Section – II

Q.4 Attempt any Four:**16**

- a) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of fuel burnt	= 1.5g
Weight of water taken	= 2300g
Water equivalent of bomb and calorimet	= 700 g
Rise in temperature	= 3.15°C
Cooling correction	= 0.05°C
Fuse wire correction	= 10 cal.
Acid correction	= 50 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587cal/g)

- b) Explain construction and working of Boy's calorimeter.
 c) Compare solid and liquid fuels.
 d) Explain vulcanization of natural rubber. List advantages of vulcanization of rubber.
 e) Explain molding of plastics in to articles by following methods.
 i) Compression molding
 ii) Injection molding
 f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:**12**

- a) Explain characteristics of batteries.
 b) Define Fuel. Explain classification of fuels.
 c) Summarize advantages and disadvantages of biodiesel.
 d) Explain synthesis, properties and applications of Buna-s
 e) The molecular wt. of polystyrene is 20800. Find its degree of polymerization (Mol. Wt. of styrene=104).
 f) Calculate the weight of $MgCl_2$ required to prepare 500 ml of 0.6M solutions. (Mol.Wt. of $MgCl_2$ =95)

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options. 14

- 1) A plastic which can be softened on heating and hardened on cooling is called:
 - a) thermo-elastic
 - b) thermoplastic
 - c) thermosetting
 - d) thermite
- 2) Natural rubber is basically a polymer of:
 - a) isoprene
 - b) propylene
 - c) ethylene
 - d) propane
- 3) Which of the following can be used for purification of substances?
 - a) IR spectroscopy
 - b) UV spectroscopy
 - c) Gas chromatography
 - d) Calorimetry
- 4) Number of gram equivalents of solute present in a liter of solution is called:
 - a) Normality
 - b) Molarity
 - c) Molality
 - d) Mole fraction
- 5) Permanent hardness in water is caused by the presence of:
 - a) calcium chloride
 - b) magnesium sulphate
 - c) both a and b
 - d) CaCO_3
- 6) A semipermeable membrane allows the flow of:
 - a) solvent molecules
 - b) solute molecules
 - c) both solute and solvent molecules
 - d) neither solute nor solvent molecules
- 7) Water is hard when it contains _____.
 - a) acid solution
 - b) precipitate in suspension
 - c) dissolved sodium salts
 - d) dissolved Ca and Mg salts
- 8) A lubricant should possess high _____.
 - a) volatility
 - b) acidity
 - c) oiliness
 - d) none of these

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	20.15	162
Mg(HCO ₃) ₂	18.73	146
CaSO ₄	17.00	136
MgCl ₂	16.5	95

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Explain Ion exchange process for softening of hard water.
 c) Define aeration. Explain different type of aerators.
 d) Define following terms
 i) Aniline point
 ii) Viscosity index
 iii) Flash point
 iv) Cloud point
 e) Define alloy. Explain purpose of alloying.
 f) Explain hydrogen evolution mechanism and oxygen absorption mechanisms.

Q.3 Attempt any Four:

12

- a) Define BOD. How it is determined. Explain its importance.
 b) Define disinfection. Explain disinfection of water by chlorine.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) In acid value determination of lubricating oil 9 gm of oil sample required 6.9 ml of N/10 KOH solution calculate its acid value.
 e) Write a note on galvanizing
 f) Define paint. Give characteristics of good paints.

Section – II

Q.4 Attempt any Four:**16**

- a) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of fuel burnt	= 1.5g
Weight of water taken	= 2300g
Water equivalent of bomb and calorimet	= 700 g
Rise in temperature	= 3.15°C
Cooling correction	= 0.05°C
Fuse wire correction	= 10 cal.
Acid correction	= 50 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587cal/g)

- b) Explain construction and working of Boy's calorimeter.
 c) Compare solid and liquid fuels.
 d) Explain vulcanization of natural rubber. List advantages of vulcanization of rubber.
 e) Explain molding of plastics in to articles by following methods.
 i) Compression molding
 ii) Injection molding
 f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:**12**

- a) Explain characteristics of batteries.
 b) Define Fuel. Explain classification of fuels.
 c) Summarize advantages and disadvantages of biodiesel.
 d) Explain synthesis, properties and applications of Buna-s
 e) The molecular wt. of polystyrene is 20800. Find its degree of polymerization (Mol. Wt. of styrene=104).
 f) Calculate the weight of $MgCl_2$ required to prepare 500 ml of 0.6M solutions. (Mol.Wt. of $MgCl_2$ =95)

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The rate of corrosion of iron in atmosphere depends upon:
 - a) The humidity of the atmosphere
 - b) The degree of pollution of the atmosphere
 - c) The frequency of rainfall
 - d) all of these factors
- 2) Galvanizing is the process of coating iron with:
 - a) Sn
 - b) Zn
 - c) Cu
 - d) Ni
- 3) A good fuel should possess:
 - a) low calorific value
 - b) high ignition temperature
 - c) high calorific value
 - d) high ash content
- 4) In bomb calorimeter the ignition of fuel is made with the help of _____.
 - a) Cu fuse wire
 - b) Mg fuse wire
 - c) Al fuse wire
 - d) Zn fuse wire
- 5) Which of the following is an example of polymer by addition polymerization?
 - a) Nylon6,6
 - b) Bakelite
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 - d) BUNA-S rubber
- 6) A plastic which can be softened on heating and hardened on cooling is called:
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 - d) thermite
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 - c) Gas chromatography
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- 9) Number of gram equivalents of solute present in a liter of solution is called:
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- 10) Permanent hardness in water is caused by the presence of:
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- a) solvent molecules
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- 12) Water is hard when it contains ____.
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 - b) precipitate in suspension
 - c) dissolved sodium salts
 - d) dissolved Ca and Mg salts
- 13) A lubricant should possess high ____.
- a) volatility
 - b) acidity
 - c) oiliness
 - d) none of these
- 14) When graphite is dispersed in oil, it is called ____.
- a) greases
 - b) aquadag
 - c) oildag
 - d) blended oil

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Engineering Chemistry
(BTCE0202/ BTME0202/ BTETE0202/ BTCSE0202/ BTEE0202)

Day & Date: Monday, 27-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	20.15	162
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Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Explain Ion exchange process for softening of hard water.
 c) Define aeration. Explain different type of aerators.
 d) Define following terms
 i) Aniline point
 ii) Viscosity index
 iii) Flash point
 iv) Cloud point
 e) Define alloy. Explain purpose of alloying.
 f) Explain hydrogen evolution mechanism and oxygen absorption mechanisms.

Q.3 Attempt any Four:

12

- a) Define BOD. How it is determined. Explain its importance.
 b) Define disinfection. Explain disinfection of water by chlorine.
 c) Define lubrication. Explain mechanism of thick film lubrication.
 d) In acid value determination of lubricating oil 9 gm of oil sample required 6.9 ml of N/10 KOH solution calculate its acid value.
 e) Write a note on galvanizing
 f) Define paint. Give characteristics of good paints.

Section – II

Q.4 Attempt any Four:

16

- a) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of fuel burnt	= 1.5g
Weight of water taken	= 2300g
Water equivalent of bomb and calorimet	= 700 g
Rise in temperature	= 3.15°C
Cooling correction	= 0.05°C
Fuse wire correction	= 10 cal.
Acid correction	= 50 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587cal/g)

- b) Explain construction and working of Boy's calorimeter.
 c) Compare solid and liquid fuels.
 d) Explain vulcanization of natural rubber. List advantages of vulcanization of rubber.
 e) Explain molding of plastics in to articles by following methods.
 i) Compression molding
 ii) Injection molding
 f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:

12

- a) Explain characteristics of batteries.
 b) Define Fuel. Explain classification of fuels.
 c) Summarize advantages and disadvantages of biodiesel.
 d) Explain synthesis, properties and applications of Buna-s
 e) The molecular wt. of polystyrene is 20800. Find its degree of polymerization (Mol. Wt. of styrene=104).
 f) Calculate the weight of $MgCl_2$ required to prepare 500 ml of 0.6M solutions. (Mol.Wt. of $MgCl_2$ =95)

Seat No.	
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Set	P
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F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0204/ BTME0204/ BTETE0204/ BTCSE0204/ BTEE0204)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if necessary and mention them clearly.
 5) Use of non-programmable single memory calculator is allowed.

Section – I

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) Soil and its behavior under the application of load is studied under the following sub branch of civil engineering.

a) Geotechnical Engineering	b) Environmental Engineering
c) Surveying	d) Town planning
- 2) Following is the sub branch of Civil Engineering deals with the properties & behavior of different fluids at rest or in motion.

a) Geotechnical Engineering	b) Fluid Mechanics
c) Surveying	d) Town planning
- 3) The load is transferred to the foundation in framed structure in the following sequence _____.

a) Beam-column-foundation-slab
b) Slab-beam-column-foundation
c) Slab-column-beam-foundation
d) Column-slab-beam-foundation
- 4) The following element of a framed structure is designed to carry self-weight only _____.

a) Foundation	b) Wall
b) Column	d) Beam
- 5) The process of killing the infective bacteria from the water and making it safe to the user is called _____.

a) Softening	b) Coagulation
c) Flocculation	d) Disinfection
- 6) Green city concept encourages _____.

a) Mass transportation	b) Pollution free city
c) Use of non-conventional energy	d) All the above
- 7) Survey conducted to find depth of water at various points in bodies of water like sea is known as _____ survey.

a) Astronomical survey	b) Hydrographic survey
c) City survey	d) Land survey

Section – II

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:07

Q.1 Choose the correct alternatives from the given options.**07**

- 1) The devices, Pumps, Compressors which use power from their operation are called, _____.
 a) power absorbing devices b) power producing devices
 c) power transferring devices d) None of these
- 2) During a cycle, the heat transfer are given by: 120kJ, -60kJ, -48kJ, and 12kJ then the net work transfer the cycle is _____.
 a) 60000 Nm b) 24000 Nm
 c) 12000 Nm d) 4400 Nm
- 3) A system comprising of a single phase, is known as _____.
 a) Open system b) Closed system
 c) Homogeneous system d) Heterogeneous system
- 4) Turning operation can be carried out on _____.
 a) lathe b) drilling machine
 c) milling machine d) Both a and b
- 5) Material used for coating the electrode is called _____.
 a) protective layer b) binder
 c) slag d) flux
- 6) The ratio of tensions in the tight and slack side of the belt is given by the relation _____.
 a) $\frac{T_1}{T_2} = e^{\mu\theta}$ b) $\frac{T_1}{T_2} = e^\theta$
 c) $\frac{T_1}{T_2} = e^\mu$ d) None of the above
- 7) Length of Cross-belt drive between two pulleys depends upon _____.
 a) Sum of the diameter b) Difference of the diameters
 c) Both a & b above d) None of the above

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0204/ BTME0204/ BTETE0204/ BTCSE0204/ BTEE0204)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
 6) Q.No.3 and Q.No.5 are long answer type question.

Section – I

- Q.2 Attempt any Five.** **15**
- a) Explain the role of Civil Engineer in various construction activities. **03**
 - b) Explain IRC Classification of Roads. **03**
 - c) Draw a neat layout of water supply scheme and Explain. **03**
 - d) What is Geographic Information System? Give its applications in engineering. **03**
 - e) Write short note "Grillage foundation". **03**
 - f) Differentiate between Active Remote Sensing & Passive Remote Sensing. **03**
 - g) Explain the classification of Surveying. **03**
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- a) During levelling following staff readings are taken, 1.235, 2.345 (instrument shifted), 3.455, 1.985(staff inverted), 2.765, 3.435. Enter the data in standard tabular form. Calculate R. L of the last station if the R. L of first station is 500.00 m. use rise and fall method. Apply usual arithmetic checks. **05**
 - b) The following consecutive readings were taken with a dumpy level along a chain line at a common interval of 15 m. The first reading was at a chainage of 165 m where the RL is 98.085. The instrument was shifted after the fourth and ninth reading. 3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035. Find RL of the all points by- HI method. **05**
 - c) With neat sketch explain any two types of shallow foundation. **04**
 - d) Write note on Principle of surveying. **04**
 - e) Explain Hydrological Cycle. **04**
 - f) Write the function. **04**
 - i) D.P.C
 - ii) Plinth
 - iii) Parapet
 - iv) Lintel

Section – II

- Q.4 Answer any Five of the following. 15**
- a) What is a Compressor? and state it's applications. **03**
 - b) Write a note on working of a Pelton wheel with its diagram. **03**
 - c) What is Soldering process? Explain with neat sketch. **03**
 - d) State and explain Kelvin-Planck and Clausius statements of the second law of thermodynamics. **03**
 - e) Write short notes on: **03**
 - i) Open belt drive
 - ii) Cross belt drive
 - f) What is system? Explain types of system. **03**
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE. **03**
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) Two parallel shafts, which have center distance between them 6 m. They are connected by crossed belt drive. The diameter of driver pulley is 0.8 m and diameter of driven pulley is 0.6 m. The direction of rotation of driven is need to be reversed by changing over an open belt drive. Calculate the length of both open and crossed belt drive and state can same belt be applied in changed arrangement? If not, then what will be the solution to fix the belt in open belt drive? **05**
 - b) Describe Drilling Machine with its block diagram. **05**
 - c) A cycle comprises three processes. The energy transfers in each are tabulated below. Complete the table. **04**

Process	Q (KJ)	W (KJ)	ΔU (KJ)
1-2	+70	+30	---
2-3	---	-60	+20
3-1	+60	---	---
 - d) Explain with neat sketch working of Centrifugal Pump. **04**
 - e) Derive an expression for length of belt for open belt drive. **04**
 - f) Sketch and describe Lathe machine operations. **04**

Seat No.	
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Set Q

Day & Date: Wednesday, 29-05-2024
Time: 10:00 AM To 1:00 PM

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Make suitable assumptions, if necessary and mention them clearly.
- 5) Use of non-programmable single memory calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) The process of killing the infective bacteria from the water and making it safe to the user is called _____.
a) Softening b) Coagulation
c) Flocculation d) Disinfection
- 2) Green city concept encourages _____.
a) Mass transportation b) Pollution free city
c) Use of non-conventional energy d) All the above
- 3) Survey conducted to find depth of water at various points in bodies of water like sea is known as _____ survey.
a) Astronomical survey b) Hydrographic survey
c) City survey d) Land survey
- 4) Soil and its behavior under the application of load is studied under the following sub branch of civil engineering.
a) Geotechnical Engineering b) Environmental Engineering
c) Surveying d) Town planning
- 5) Following is the sub branch of Civil Engineering deals with the properties & behavior of different fluids at rest or in motion.
a) Geotechnical Engineering b) Fluid Mechanics
c) Surveying d) Town planning
- 6) The load is transferred to the foundation in framed structure in the following sequence _____.
a) Beam-column-foundation-slab
b) Slab-beam-column-foundation
c) Slab-column-beam-foundation
d) Column-slab-beam-foundation
- 7) The following element of a framed structure is designed to carry self-weight only _____.
a) Foundation b) Wall
c) Column d) Beam

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0204/ BTME0204/ BTETE0204/ BTCSE0204/ BTEE0204)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
 6) Q.No.3 and Q.No.5 are long answer type question.

Section – I

- Q.2 Attempt any Five.** **15**
- Explain the role of Civil Engineer in various construction activities. **03**
 - Explain IRC Classification of Roads. **03**
 - Draw a neat layout of water supply scheme and Explain. **03**
 - What is Geographic Information System? Give its applications in engineering. **03**
 - Write short note "Grillage foundation". **03**
 - Differentiate between Active Remote Sensing & Passive Remote Sensing. **03**
 - Explain the classification of Surveying. **03**
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- During levelling following staff readings are taken, 1.235, 2.345 (instrument shifted), 3.455, 1.985(staff inverted), 2.765, 3.435. Enter the data in standard tabular form. Calculate R. L of the last station if the R. L of first station is 500.00 m. use rise and fall method. Apply usual arithmetic checks. **05**
 - The following consecutive readings were taken with a dumpy level along a chain line at a common interval of 15 m. The first reading was at a chainage of 165 m where the RL is 98.085. The instrument was shifted after the fourth and ninth reading. 3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035. Find RL of the all points by- HI method. **05**
 - With neat sketch explain any two types of shallow foundation. **04**
 - Write note on Principle of surveying. **04**
 - Explain Hydrological Cycle. **04**
 - Write the function. **04**
 - D.P.C
 - Plinth
 - Parapet
 - Lintel

Section – II

- Q.4 Answer any Five of the following. 15**
- a) What is a Compressor? and state it's applications. 03**
 - b) Write a note on working of a Pelton wheel with its diagram. 03**
 - c) What is Soldering process? Explain with neat sketch. 03**
 - d) State and explain Kelvin-Planck and Clausius statements of the second law of thermodynamics. 03**
 - e) Write short notes on: 03**
 - i) Open belt drive
 - ii) Cross belt drive
 - f) What is system? Explain types of system. 03**
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE. 03**
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) Two parallel shafts, which have center distance between them 6 m. They are connected by crossed belt drive. The diameter of driver pulley is 0.8 m and diameter of driven pulley is 0.6 m. The direction of rotation of driven is need to be reversed by changing over an open belt drive. Calculate the length of both open and crossed belt drive and state can same belt be applied in changed arrangement? If not, then what will be the solution to fix the belt in open belt drive? 05**
 - b) Describe Drilling Machine with its block diagram. 05**
 - c) A cycle comprises three processes. The energy transfers in each are tabulated below. Complete the table. 04**

Process	Q (KJ)	W (KJ)	ΔU (KJ)
1-2	+70	+30	---
2-3	---	-60	+20
3-1	+60	---	---
 - d) Explain with neat sketch working of Centrifugal Pump. 04**
 - e) Derive an expression for length of belt for open belt drive. 04**
 - f) Sketch and describe Lathe machine operations. 04**

Seat No.	
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Set	R
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F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0204/ BTME0204/ BTETE0204/ BTCSE0204/ BTEE0204)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if necessary and mention them clearly.
 5) Use of non-programmable single memory calculator is allowed.

Section – I

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) The load is transferred to the foundation in framed structure in the following sequence _____.
 a) Beam-column-foundation-slab
 b) Slab-beam-column-foundation
 c) Slab-column-beam-foundation
 d) Column-slab-beam-foundation
- 2) The following element of a framed structure is designed to carry self-weight only _____.
 a) Foundation
 b) Column
 c) Wall
 d) Beam
- 3) The process of killing the infective bacteria from the water and making it safe to the user is called _____.
 a) Softening
 b) Coagulation
 c) Flocculation
 d) Disinfection
- 4) Green city concept encourages _____.
 a) Mass transportation
 b) Pollution free city
 c) Use of non-conventional energy
 d) All the above
- 5) Survey conducted to find depth of water at various points in bodies of water like sea is known as _____ survey.
 a) Astronomical survey
 b) Hydrographic survey
 c) City survey
 d) Land survey
- 6) Soil and its behavior under the application of load is studied under the following sub branch of civil engineering.
 a) Geotechnical Engineering
 b) Environmental Engineering
 c) Surveying
 d) Town planning
- 7) Following is the sub branch of Civil Engineering deals with the properties & behavior of different fluids at rest or in motion.
 a) Geotechnical Engineering
 b) Fluid Mechanics
 c) Surveying
 d) Town planning

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0204/ BTME0204/ BTETE0204/ BTCSE0204/ BTEE0204)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
 6) Q.No.3 and Q.No.5 are long answer type question.

Section – I

- Q.2 Attempt any Five.** **15**
- a) Explain the role of Civil Engineer in various construction activities. **03**
 - b) Explain IRC Classification of Roads. **03**
 - c) Draw a neat layout of water supply scheme and Explain. **03**
 - d) What is Geographic Information System? Give its applications in engineering. **03**
 - e) Write short note "Grillage foundation". **03**
 - f) Differentiate between Active Remote Sensing & Passive Remote Sensing. **03**
 - g) Explain the classification of Surveying. **03**
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- a) During levelling following staff readings are taken, 1.235, 2.345 (instrument shifted), 3.455, 1.985(staff inverted), 2.765, 3.435. Enter the data in standard tabular form. Calculate R. L of the last station if the R. L of first station is 500.00 m. use rise and fall method. Apply usual arithmetic checks. **05**
 - b) The following consecutive readings were taken with a dumpy level along a chain line at a common interval of 15 m. The first reading was at a chainage of 165 m where the RL is 98.085. The instrument was shifted after the fourth and ninth reading. 3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035. Find RL of the all points by- HI method. **05**
 - c) With neat sketch explain any two types of shallow foundation. **04**
 - d) Write note on Principle of surveying. **04**
 - e) Explain Hydrological Cycle. **04**
 - f) Write the function. **04**
 - i) D.P.C
 - ii) Plinth
 - iii) Parapet
 - iv) Lintel

Section – II

- Q.4 Answer any Five of the following.** **15**
- a) What is a Compressor? and state it's applications. **03**
 - b) Write a note on working of a Pelton wheel with its diagram. **03**
 - c) What is Soldering process? Explain with neat sketch. **03**
 - d) State and explain Kelvin-Plank and Clausious statements of the second law of thermodynamics. **03**
 - e) Write short notes on: **03**
 - i) Open belt drive
 - ii) Cross belt drive
 - f) What is system? Explain types of system. **03**
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE. **03**
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- a) Two parallel shafts, which have center distance between them 6 m. They are connected by crossed belt drive. The diameter of driver pulley is 0.8 m and diameter of driven pulley is 0.6 m. The direction of rotation of driven is need to be reversed by changing over an open belt drive. Calculate the length of both open and crossed belt drive and state can same belt be applied in changed arrangement? If not, then what will be the solution to fix the belt in open belt drive? **05**
 - b) Describe Drilling Machine with its block diagram. **05**
 - c) A cycle comprises three processes. The energy transfers in each are tabulated below. Complete the table. **04**

Process	Q (KJ)	W (KJ)	ΔU (KJ)
1-2	+70	+30	---
2-3	---	-60	+20
3-1	+60	---	---
 - d) Explain with neat sketch working of Centrifugal Pump. **04**
 - e) Derive an expression for length of belt for open belt drive. **04**
 - f) Sketch and describe Lathe machine operations. **04**

Seat No.	
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Set	S
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F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0204/ BTME0204/ BTETE0204/ BTCSE0204/ BTEE0204)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if necessary and mention them clearly.
 5) Use of non-programmable single memory calculator is allowed.

Section – I

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) Survey conducted to find depth of water at various points in bodies of water like sea is known as _____ survey.

a) Astronomical survey	b) Hydrographic survey
c) City survey	d) Land survey
- 2) Soil and its behavior under the application of load is studied under the following sub branch of civil engineering.

a) Geotechnical Engineering	b) Environmental Engineering
c) Surveying	d) Town planning
- 3) Following is the sub branch of Civil Engineering deals with the properties & behavior of different fluids at rest or in motion.

a) Geotechnical Engineering	b) Fluid Mechanics
c) Surveying	d) Town planning
- 4) The load is transferred to the foundation in framed structure in the following sequence _____.

a) Beam-column-foundation-slab
b) Slab-beam-column-foundation
c) Slab-column-beam-foundation
d) Column-slab-beam-foundation
- 5) The following element of a framed structure is designed to carry self-weight only _____.

a) Foundation	b) Wall
b) Column	d) Beam
- 6) The process of killing the infective bacteria from the water and making it safe to the user is called _____.

a) Softening	b) Coagulation
c) Flocculation	d) Disinfection
- 7) Green city concept encourages _____.

a) Mass transportation	b) Pollution free city
c) Use of non-conventional energy	d) All the above

Section – II

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:07

Q.1 Choose the correct alternatives from the given options.**07**

- 1) Length of Cross-belt drive between two pulleys depends upon _____.
 a) Sum of the diameter b) Difference of the diameters
 c) Both a & b above d) None of the above
- 2) The devices, Pumps, Compressors which use power from their operation are called, _____.
 a) power absorbing devices b) power producing devices
 c) power transferring devices d) None of these
- 3) During a cycle, the heat transfer are given by: 120kJ, -60kJ, -48kJ, and 12kJ then the net work transfer the cycle is _____.
 a) 60000 Nm b) 24000 Nm
 c) 12000 Nm d) 4400 Nm
- 4) A system comprising of a single phase, is known as _____.
 a) Open system b) Closed system
 c) Homogeneous system d) Heterogeneous system
- 5) Turning operation can be carried out on _____.
 a) lathe b) drilling machine
 c) milling machine d) Both a and b
- 6) Material used for coating the electrode is called _____.
 a) protective layer b) binder
 c) slag d) flux
- 7) The ratio of tensions in the tight and slack side of the belt is given by the relation _____.
 a) $\frac{T_1}{T_2} = e^{\mu\theta}$ b) $\frac{T_1}{T_2} = e^{\theta}$
 c) $\frac{T_1}{T_2} = e^{\mu}$ d) None of the above

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - II) (New) (NEP CBCS) Examination: March/April-2024
Basics of Civil and Mechanical Engineering
(BTCE0204/ BTME0204/ BTETE0204/ BTCSE0204/ BTEE0204)

Day & Date: Wednesday, 29-05-2024
 Time: 10:00 AM To 1:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data wherever needed and mention it clearly.
 4) Use of non-programmable single memory calculator is allowed.
 5) Q.No.2 and Q.No.4 are short answer type question.
 6) Q.No.3 and Q.No.5 are long answer type question.

Section – I

- Q.2 Attempt any Five.** **15**
- a) Explain the role of Civil Engineer in various construction activities. **03**
 - b) Explain IRC Classification of Roads. **03**
 - c) Draw a neat layout of water supply scheme and Explain. **03**
 - d) What is Geographic Information System? Give its applications in engineering. **03**
 - e) Write short note "Grillage foundation". **03**
 - f) Differentiate between Active Remote Sensing & Passive Remote Sensing. **03**
 - g) Explain the classification of Surveying. **03**
- Q.3 Attempt any one out of (a) and (b) and solve any two out of (c) to (f)** **13**
- a) During levelling following staff readings are taken, 1.235, 2.345 (instrument shifted), 3.455, 1.985(staff inverted), 2.765, 3.435. Enter the data in standard tabular form. Calculate R. L of the last station if the R. L of first station is 500.00 m. use rise and fall method. Apply usual arithmetic checks. **05**
 - b) The following consecutive readings were taken with a dumpy level along a chain line at a common interval of 15 m. The first reading was at a chainage of 165 m where the RL is 98.085. The instrument was shifted after the fourth and ninth reading. 3.150, 2.245, 1.125, 0.860, 3.125, 2.760, 1.835, 1.470, 1.965, 1.225, 2.390 and 3.035. Find RL of the all points by- HI method. **05**
 - c) With neat sketch explain any two types of shallow foundation. **04**
 - d) Write note on Principle of surveying. **04**
 - e) Explain Hydrological Cycle. **04**
 - f) Write the function. **04**
 - i) D.P.C
 - ii) Plinth
 - iii) Parapet
 - iv) Lintel

Section – II

- Q.4 Answer any Five of the following. 15**
- a) What is a Compressor? and state it's applications. **03**
 - b) Write a note on working of a Pelton wheel with its diagram. **03**
 - c) What is Soldering process? Explain with neat sketch. **03**
 - d) State and explain Kelvin-Planck and Clausius statements of the second law of thermodynamics. **03**
 - e) Write short notes on: **03**
 - i) Open belt drive
 - ii) Cross belt drive
 - f) What is system? Explain types of system. **03**
 - g) Derive an expression for velocity of fluid at the exit of nozzle, by applying SFEE. **03**
- Q.5 Solve any one out of (a) and (b) and solve any two out of (c) to (f) 13**
- a) Two parallel shafts, which have center distance between them 6 m. They are connected by crossed belt drive. The diameter of driver pulley is 0.8 m and diameter of driven pulley is 0.6 m. The direction of rotation of driven is need to be reversed by changing over an open belt drive. Calculate the length of both open and crossed belt drive and state can same belt be applied in changed arrangement? If not, then what will be the solution to fix the belt in open belt drive? **05**
 - b) Describe Drilling Machine with its block diagram. **05**
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Process	Q (KJ)	W (KJ)	ΔU (KJ)
1-2	+70	+30	---
2-3	---	-60	+20
3-1	+60	---	---
 - d) Explain with neat sketch working of Centrifugal Pump. **04**
 - e) Derive an expression for length of belt for open belt drive. **04**
 - f) Sketch and describe Lathe machine operations. **04**

Seat No.	
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Set P

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering
(BTCE0205/ BTME0205/ BTETE0205/ BTCSE0205/ BTEE0205)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

Section - I

MCQ/Objective Type Questions

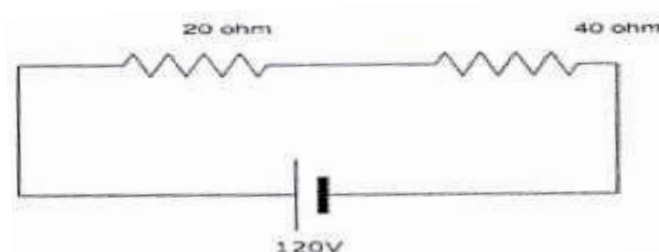
Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) The algebraic sign of an IR drop is primarily dependent upon the _____.
 a) amount of current flowing through it
 b) value of R
 c) direction of current flow
 d) battery connection
- 2) What is responsible for the current to flow?
 a) Protons
 b) Electrons
 c) Nucleus
 d) Protons and Electrons
- 3) Which of the following according to KCL must be zero?
 a) Algebraic sum of currents in closed-loop
 b) Algebraic sum of power in closed-loop
 c) Algebraic sum of currents entering and leaving a junction
 d) Algebraic sum of voltages across the input and output
- 4) Find the current in the circuit.



- a) 1 A
 b) 2 A
 c) 3 A
 d) 4 A
- 5) There is 900 mA of current through a wire with 40 turns. What is the reluctance of the circuit if the flux is 400Wb?
 a) 14,400 At/Wb
 b) 1,440 At/Wb
 c) 9,000 At/Wb
 d) 90,000 At/Wb

- 6) Which of the following is not an expression power?
- | | |
|----------------|----------------|
| a) $P = VI$ | b) $P = I^2 R$ |
| c) $P = V^2/R$ | d) $P = I/R$ |
- 7) Power factor of the following circuit will be zero _____.
- | | |
|----------------|---------------------|
| a) Resistance | b) inductance |
| c) Capacitance | d) both (b) and (c) |

Seat No.	
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Set	P
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F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering
(BTCE0205/ BTME0205/ BTETE0205/ BTCSE0205/ BTEE0205)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

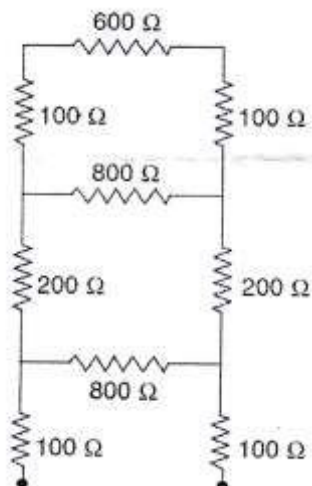
Instructions: 1) All questions are compulsory.
 3) Figures to the right indicates full marks.

Section – I

Q.2 Solve any FOUR.

16

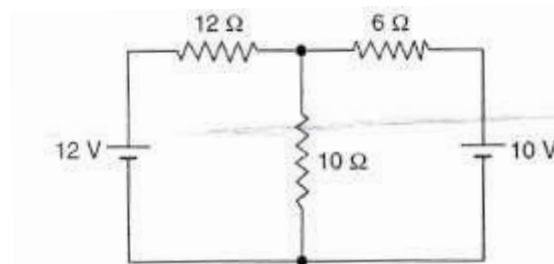
- Drive the equation for converting delta-star transformation.
- What is the equivalent resistance of the network shown in Fig.



- Draw and explain the concept of leakage and fringing in magnetic circuit.
- Define and derive expression for RMS value of sinusoidal alternating quantity.
- A coil takes 2.5 amps, when connected across 200 volts 50 Hz mains. The power consumed by the coil is found to be 400 watts. Find the inductance and the power factor of the coil.
- Define the following terms:
 - MMF
 - Reluctance
 - Absolute and
 - relative permeabilities

Q.3 Solve any TWO.

- a) In the circuit of Fig., find the current through each resistor and voltage drop across each resistor.



- b) Explain in details of emf equation for single phase transformer. Write equation for transformation ratio.
- c) A resistance $12\ \Omega$, an inductance of $0.15\ H$ and a capacitance of $100\ \mu F$ are connected in series across a $100\ V$, $50\ Hz$ supply. Calculate:
- The current
 - The phase difference between current and the supply voltage
 - Power consumed

Section – II**Q.4 Solve any FOUR.****16**

- a) Draw and Explain forward and reverse biasing of PN Junction diode.
- b) What is need of filter? Explain capacitor filter.
- c) Derive the relation between α and β gain of transistor.
- d)
 - i) Convert $(AF9.C)_{16}$ to decimal and octal
 - ii) Perform the subtraction using 2's compliment $(1766)_8 - (23)_8$
- e) Draw and explain basic gates with symbol.....

Q.5 Solve any TWO.**12**

- a) What is meant by universal gate? Derive basic gates using NAND gate.
- b) Draw and explain input-output characteristics for CE configuration.
- c) Explain the operation of center tap full wave rectifier with help of neat circuit diagram & waveform.

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering
(BTCE0205/ BTME0205/ BTETE0205/ BTCSE0205/ BTEE0205)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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Section - I

MCQ/Objective Type Questions

Duration: 30 Minutes

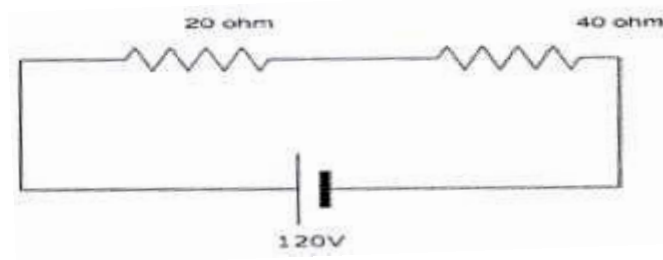
Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) There is 900 mA of current through a wire with 40 turns. What is the reluctance of the circuit if the flux is 400Wb?
 - a) 14,400 At/Wb
 - b) 1,440 At/Wb
 - c) 9,000 At/Wb
 - d) 90,000 At/Wb
- 2) Which of the following is not an expression power?
 - a) $P = VI$
 - b) $P = I^2 R$
 - c) $P = V^2 / R$
 - d) $P = I / R$
- 3) Power factor of the following circuit will be zero _____.
 - a) Resistance
 - b) inductance
 - c) Capacitance
 - d) both (b) and (c)
- 4) The algebraic sign of an IR drop is primarily dependent upon the _____.
 - a) amount of current flowing through it
 - b) value of R
 - c) direction of current flow
 - d) battery connection
- 5) What is responsible for the current to flow?
 - a) Protons
 - b) Electrons
 - c) Nucleus
 - d) Protons and Electrons
- 6) Which of the following according to KCL must be zero?
 - a) Algebraic sum of currents in closed-loop
 - b) Algebraic sum of power in closed-loop
 - c) Algebraic sum of currents entering and leaving a junction
 - d) Algebraic sum of voltages across the input and output

7) Find the current in the circuit.



- a) 1 A
- c) 3 A

- b) 2 A
- d) 4 A

Section - II

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.**07**

- 1) A transistor connected in common collector configuration has _____.
 - a) high input and low output resistance
 - b) low input and high output resistance
 - c) low input and low output resistance
 - d) high input and high output resistance
- 2) The decimal no. $(37)_{10}$ is equivalent to binary no. _____.
 - a) $(11000)_2$
 - b) $(10100)_2$
 - c) $(100101)_2$
 - d) $(11001)_2$
- 3) In Boolean algebra $A(A + B) =$
 - a) A
 - b) B
 - c) AB
 - d) $A + B$
- 4) Addition of pentavalent impurity to a semiconductor creates many _____.
 - a) free electrons
 - b) holes
 - c) valence electrons
 - d) bound electrons
- 5) The forward voltage drop across the germanium diode is about _____.
 - a) 2.5 V
 - b) 0.3 V
 - c) 10 V
 - d) 0.7 V
- 6) Rectification efficiency of full-wave rectifier will be _____.
 - a) 81.2%
 - b) 40.6%
 - c) 48%
 - d) 78.5%
- 7) The base of transistor is ____doped.
 - a) Heavily
 - b) moderately
 - c) lightly
 - d) none of above

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering
(BTCE0205/ BTME0205/ BTETE0205/ BTCSE0205/ BTEE0205)

Day & Date: Friday, 31-05-2024
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Max. Marks: 56

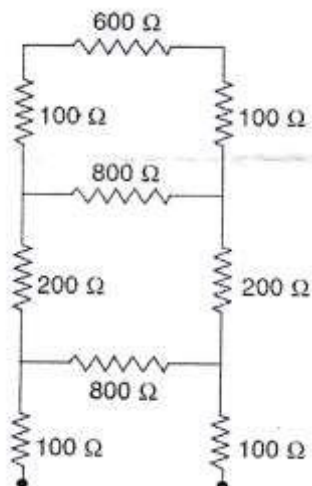
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Section – I

Q.2 Solve any FOUR.

16

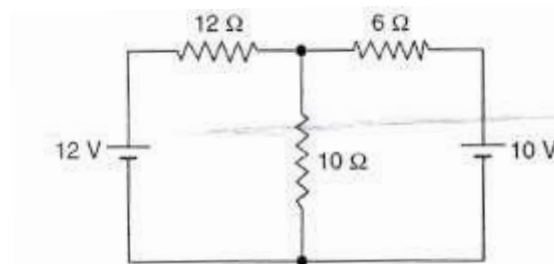
- a) Drive the equation for converting delta-star transformation.
 b) What is the equivalent resistance of the network shown in Fig.



- c) Draw and explain the concept of leakage and fringing in magnetic circuit.
 d) Define and derive expression for RMS value of sinusoidal alternating quantity.
 e) A coil takes 2.5 amps, when connected across 200 volts 50 Hz mains. The power consumed by the coil is found to be 400 watts. Find the inductance and the power factor of the coil.
 f) Define the following terms:
 i) MMF
 ii) Reluctance
 iii) Absolute and
 iv) relative permeabilities

Q.3 Solve any TWO.

- a) In the circuit of Fig., find the current through each resistor and voltage drop across each resistor.



- b) Explain in details of emf equation for single phase transformer. Write equation for transformation ratio.
- c) A resistance $12\ \Omega$, an inductance of $0.15\ H$ and a capacitance of $100\ \mu F$ are connected in series across a $100\ V$, $50\ Hz$ supply. Calculate:
- The current
 - The phase difference between current and the supply voltage
 - Power consumed

Section – II**Q.4 Solve any FOUR.****16**

- a) Draw and Explain forward and reverse biasing of PN Junction diode.
- b) What is need of filter? Explain capacitor filter.
- c) Derive the relation between α and β gain of transistor.
- d)
 - i) Convert $(AF9.C)_{16}$ to decimal and octal
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- e) Draw and explain basic gates with symbol.....

Q.5 Solve any TWO.**12**

- a) What is meant by universal gate? Derive basic gates using NAND gate.
- b) Draw and explain input-output characteristics for CE configuration.
- c) Explain the operation of center tap full wave rectifier with help of neat circuit diagram & waveform.

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering
(BTCE0205/ BTME0205/ BTETE0205/ BTCSE0205/ BTEE0205)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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Section - I

MCQ/Objective Type Questions

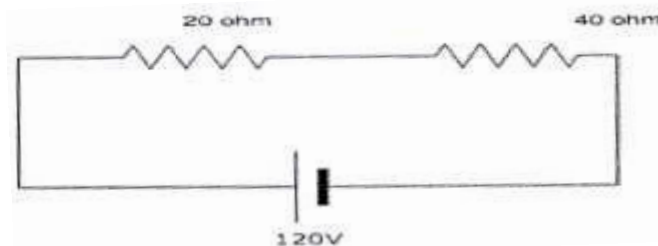
Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.

07

- 1) Which of the following according to KCL must be zero?
 - a) Algebraic sum of currents in closed-loop
 - b) Algebraic sum of power in closed-loop
 - c) Algebraic sum of currents entering and leaving a junction
 - d) Algebraic sum of voltages across the input and output
- 2) Find the current in the circuit.



- a) 1 A
 - b) 2 A
 - c) 3 A
 - d) 4 A
- 3) There is 900 mA of current through a wire with 40 turns. What is the reluctance of the circuit if the flux is 400Wb?
 - a) 14,400 At/Wb
 - b) 1,440 At/Wb
 - c) 9,000 At/Wb
 - d) 90,000 At/Wb
- 4) Which of the following is not an expression power?
 - a) $P = VI$
 - b) $P = I^2 R$
 - c) $P = V^2 / R$
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- 5) Power factor of the following circuit will be zero _____.
 - a) Resistance
 - b) inductance
 - c) Capacitance
 - d) both (b) and (c)

- 6) The algebraic sign of an IR drop is primarily dependent upon the _____.
a) amount of current flowing through it
b) value of R
c) direction of current flow
d) battery connection
- 7) What is responsible for the current to flow?
a) Protons
b) Electrons
c) Nucleus
d) Protons and Electrons

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering
(BTCE0205/ BTME0205/ BTETE0205/ BTCSE0205/ BTEE0205)

Day & Date: Friday, 31-05-2024
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Max. Marks: 56

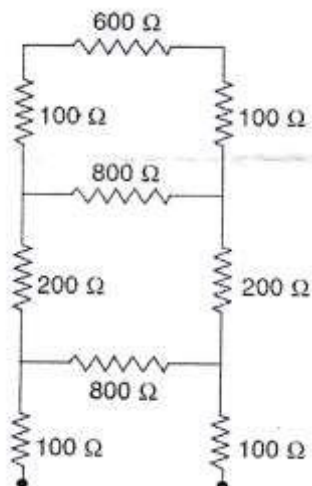
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Section – I

Q.2 Solve any FOUR.

16

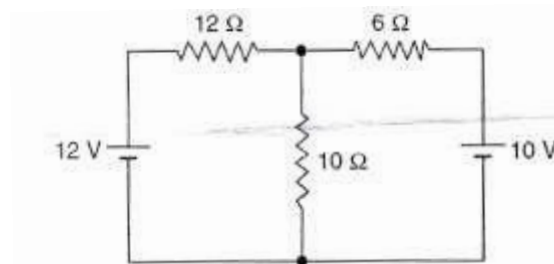
- a) Drive the equation for converting delta-star transformation.
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- c) Draw and explain the concept of leakage and fringing in magnetic circuit.
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 e) A coil takes 2.5 amps, when connected across 200 volts 50 Hz mains. The power consumed by the coil is found to be 400 watts. Find the inductance and the power factor of the coil.
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Q.3 Solve any TWO.

- a) In the circuit of Fig., find the current through each resistor and voltage drop across each resistor.



- b) Explain in details of emf equation for single phase transformer. Write equation for transformation ratio.
- c) A resistance $12\ \Omega$, an inductance of $0.15\ H$ and a capacitance of $100\ \mu F$ are connected in series across a $100\ V$, $50\ Hz$ supply. Calculate:
- The current
 - The phase difference between current and the supply voltage
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Section – II**Q.4 Solve any FOUR.****16**

- a) Draw and Explain forward and reverse biasing of PN Junction diode.
- b) What is need of filter? Explain capacitor filter.
- c) Derive the relation between α and β gain of transistor.
- d)
 - i) Convert $(AF9.C)_{16}$ to decimal and octal
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- a) What is meant by universal gate? Derive basic gates using NAND gate.
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- c) Explain the operation of center tap full wave rectifier with help of neat circuit diagram & waveform.

Seat No.	
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Day & Date: Friday, 31-05-2024
Time: 10:00 AM To 01:00 PM

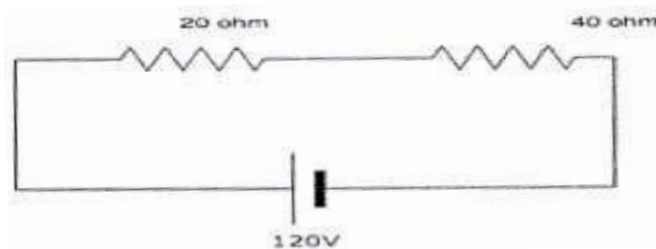
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MCQ/Objective Type Questions

Marks: 07

07

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- 5) Find the current in the circuit.



- [illegible]

- 6) There is 900 mA of current through a wire with 40 turns. What is the reluctance of the circuit if the flux is 400Wb?
- | | |
|-----------------|-----------------|
| a) 14,400 At/Wb | b) 1,440 At/Wb |
| c) 9,000 At/Wb | d) 90,000 At/Wb |
- 7) Which of the following is not an expression power?
- | | |
|----------------|---------------|
| a) $P = VI$ | b) $P = I^2R$ |
| c) $P = V^2/R$ | d) $P = I/R$ |

Section - II

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 07

Q.1 Choose the correct option from the following.**07**

- 1) In Boolean algebra $A(A + B) =$
 - a) A
 - b) B
 - c) AB
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- 2) Addition of pentavalent impurity to a semiconductor creates many _____.
 - a) free electrons
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- 7) The decimal no. $(37)_{10}$ is equivalent to binary no. _____.
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 - c) $(100101)_2$
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Seat No.	
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Set	S
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F.Y. (B.Tech.) (Sem-II) (New) (NEP CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering
(BTCE0205/ BTME0205/ BTETE0205/ BTCSE0205/ BTEE0205)

Day & Date: Friday, 31-05-2024
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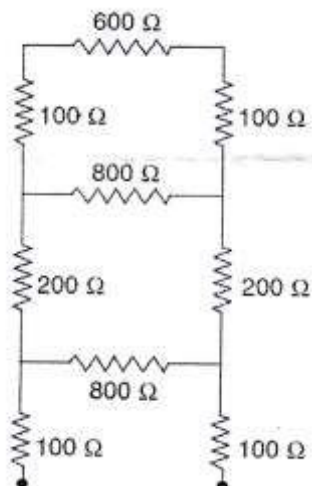
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Section – I

Q.2 Solve any FOUR.

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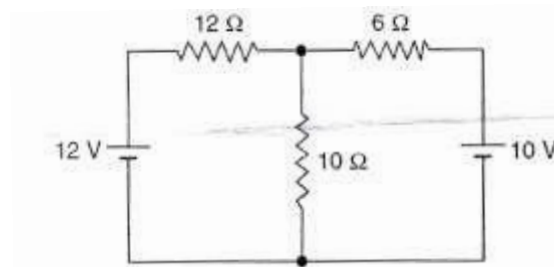
- a) Drive the equation for converting delta-star transformation.
- b) What is the equivalent resistance of the network shown in Fig.



- c) Draw and explain the concept of leakage and fringing in magnetic circuit.
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- e) A coil takes 2.5 amps, when connected across 200 volts 50 Hz mains. The power consumed by the coil is found to be 400 watts. Find the inductance and the power factor of the coil.
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Q.3 Solve any TWO.

- a) In the circuit of Fig., find the current through each resistor and voltage drop across each resistor.



- b) Explain in details of emf equation for single phase transformer. Write equation for transformation ratio.
- c) A resistance $12\ \Omega$, an inductance of $0.15\ H$ and a capacitance of $100\ \mu F$ are connected in series across a $100\ V$, $50\ Hz$ supply. Calculate:
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Section – II**Q.4 Solve any FOUR.****16**

- a) Draw and Explain forward and reverse biasing of PN Junction diode.
- b) What is need of filter? Explain capacitor filter.
- c) Derive the relation between α and β gain of transistor.
- d)
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Q.5 Solve any TWO.**12**

- a) What is meant by universal gate? Derive basic gates using NAND gate.
- b) Draw and explain input-output characteristics for CE configuration.
- c) Explain the operation of center tap full wave rectifier with help of neat circuit diagram & waveform.

**Seat
No.**

Max. Marks: 70

Marks: 14

14

- Page 1 of 16

- 8) The value of $B\left[\frac{5}{2}, \frac{1}{2}\right]$ is _____.
 a) $\frac{\pi}{3}$ b) $\frac{\pi}{8}$
 c) $\frac{3\pi}{8}$ d) $\frac{8\pi}{3}$
- 9) Which of the following is not true?
 a) $\sqrt{\frac{1}{2}} = \sqrt{\pi}$ b) $\sqrt{\frac{1}{4}} \sqrt{\frac{3}{4}} = \sqrt{2\pi}$
 c) $\sqrt{n+1} = n\sqrt{n}$ d) $\sqrt{-2} = \infty$
- 10) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a _____.
 a) node b) cusp
 c) conjugate point d) isolated point
- 11) For the curve $r = a \sin 3\theta$ the equations of tangents at the pole are _____.
 a) $\theta = \frac{\pi}{2}, \frac{\pi}{3}, \frac{2\pi}{3}, \dots$ b) $\theta = \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \dots$
 c) $\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \dots$ d) $\theta = 0, \pi, 3\pi, \dots$
- 12) The value of $\int_0^1 \int_0^{\pi/2} r \sin \theta \, d\theta \, dr =$ _____.
 a) $\frac{1}{2}$ b) $\frac{\pi}{2}$
 c) 0 d) $\frac{-1}{2}$
- 13) Area bounded by two plane curves $y = f_1(x), y = f_2(x), x = a, x = b$ is given by _____.
 a) $\int_a^b \int_c^d dx \, dy$ b) $\int_a^b \int_c^d x \, dy \, dx$
 c) $\int_a^b \int_{f_1(x)}^{f_2(x)} dx \, dy$ d) $\int_a^b \int_c^d y \, dx \, dy$
- 14) For $\int_0^\infty \int_x^\infty f(x, y) \, dy \, dx$ by the change of order of integration, we get _____.
 a) $\int_0^\infty \int_0^x f(x, y) \, dx \, dy$ b) $\int_x^\infty \int_0^\infty f(x, y) \, dx \, dy$
 c) $\int_0^\infty \int_y^\infty f(x, y) \, dx \, dy$ d) $\int_0^\infty \int_0^y f(x, y) \, dx \, dy$

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTN10203)

Day & Date: Tuesday, 21-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any three questions.

09

a) $\frac{dy}{dx} = \frac{2x + 2y + 3}{y + x + 1}$

b) Test if the following series converges or diverges.

$$\sum_{n=1}^{\infty} (n+1)^{1/3} - n^{1/3}$$

c) Find the analytic function $f(z) = u + iv$ where $v = e^x \sin y$

d) Find the orthogonal Trajectory of $r = a(1 + \sin \theta)$

e) Test the convergence of the series $\frac{1}{3} + \left(\frac{2}{5}\right)^5 + \left(\frac{3}{7}\right)^3 + \dots$

Q.3 Attempt any three questions.

09

a) Prove that $(1 + i\sqrt{3})^8 + (1 - i\sqrt{3})^8 = -2^8$

b) Solve $x^4 - x^3 + x^2 - x + 1 = 0$

c) Solve $(1 + y^2)dx = (e^{\tan^{-1} y} - x)dy$

d) Test if the following series for convergence or divergence

$$\left(\frac{1}{3}\right)^2 + \left(\frac{1.2}{3.50}\right)^2 + \left(\frac{1.2.3}{3.5.7}\right)^2 + \dots$$

e) Solve $(\sec x \tan x \tan y - e^x)dx + (\sec x \sec^2 y)dy = 0$

Q.4 Attempt any two questions.

10

a) In a single closed circuit the current I at time t is given by $R \frac{dq}{dt} + \frac{q}{c} = E$. Find the current " i " at time t , given that at $t = 0$ $i = 0$ and $q = 0$, also E, L, R are constants.

b) Find the n th roots of unity. Show that the roots are in G.P., their sum is zero and product is $(-1)^{n-1}$

c) Test the series for Absolute or Conditional convergence

$$\frac{2}{3} - \frac{3}{4} + \frac{1}{2} - \frac{4}{5} + \frac{1}{3} - \frac{5}{6} + \dots$$

Section – II

Q.5 Solve any three of the following questions.**09**

a) Evaluate $\int_0^{\infty} x^5 5^{-x} dx$

b) Evaluate $\int_0^{\infty} \frac{\tan^{-1}\left(\frac{x}{a}\right) - \tan^{-1}\left(\frac{x}{b}\right)}{x} dx$

c) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x \, dz dx dy$

d) Trace the curve $x = a(t - \sin t), y = a(1 + \cos t)$ with full justification.

e) Find the area which is inside the cardioid $r = 2(1 + \cos \theta)$ and outside the circle $r = 2$

Q.6 Solve any three of the following questions.**09**

a) Evaluate $\int_0^2 x^4 (8 - x^3)^{-\frac{1}{3}} dx$

b) Trace the following curves with full justification $r = a \cos 3\theta$

c) Find the mass of the lamina bounded by the $y^2 = ax$ and $x^2 = ay$, if density of the lamina at a point varies as the square of its distance from the origin.

d) Evaluate $\iint_R (x^2 + y^2) dx dy$ over the area of triangle whose vertices are $(0,1), (1,1), (1,2)$

e) Change to polar co-ordinate system and evaluate $\int_0^a \int_y^a \frac{x^2 dx dy}{(x^2 + y^2)^{\frac{1}{2}}}$

Q.7 Solve any two of the following questions.**10**

a) Change the order of integration and evaluate $\int_0^{\infty} \int_0^x e^{\frac{-x^2}{y}} x \, dx dy$

b) Trace the following curves with full justification $xy^2 = a(x^2 - a^2)$

c) Prove that $\int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx = B(m, n)$ and hence evaluate

$$\int_0^{\infty} \frac{\sqrt{x}}{(1+x)^2} dx$$

Seat
No.Set **Q**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTN10203)

Day & Date: Tuesday, 21-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative.**14**1) The value of $B \left[\frac{5}{2}, \frac{1}{2} \right]$ is _____.

- a) $\frac{\pi}{3}$
 c) $\frac{3\pi}{8}$

- b) $\frac{\pi}{8}$
 d) $\frac{8\pi}{3}$

2) Which of the following is not true?

a) $\sqrt{\frac{1}{2}} = \sqrt{\pi}$

b) $\sqrt{\frac{1}{4}} \sqrt{\frac{3}{4}} = \sqrt{2\pi}$

c) $\sqrt{n+1} = n\sqrt{n}$

d) $\sqrt{-2} = \infty$

3) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a _____.

- a) node
 c) conjugate point

- b) cusp
 d) isolated point

4) For the curve $r = a \sin 3\theta$ the equations of tangents at the pole are _____.

a) $\theta = \frac{\pi}{2}, \frac{\pi}{3}, \frac{2\pi}{3}, \dots$

b) $\theta = \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \dots$

c) $\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \dots$

d) $\theta = 0, \pi, 3\pi, \dots$

5) The value of $\int_0^1 \int_0^{\pi/2} r \sin \theta \, d\theta \, dr =$ _____.

- a) $\frac{1}{2}$
 c) 0

- b) $\frac{\pi}{2}$
 d) $\frac{-1}{2}$

- 6) Area bounded by two plane curves $y = f_1(x), y = f_2(x), x = a, x = b$ is given by ____.
- a) $\int_a^b \int_c^d dx dy$ b) $\int_a^b \int_c^d x dy dx$
- c) $\int_a^b \int_{f_1(x)}^{f_2(x)} dx dy$ d) $\int_a^b \int_c^d y dx dy$
- 7) For $\int_0^\infty \int_x^\infty f(x, y) dy dx$ by the change of order of integration, we get ____.
- a) $\int_0^\infty \int_0^x f(x, y) dx dy$ b) $\int_x^\infty \int_0^\infty f(x, y) dx dy$
- c) $\int_0^\infty \int_y^\infty f(x, y) dx dy$ d) $\int_0^\infty \int_0^y f(x, y) dx dy$
- 8) $\cos(ix)$ is equal to ____.
- a) $i \cos x$ b) $-i \cosh x$
- c) $\cosh x$ d) $i \sinh x$
- 9) Which of the following differential equation is linear?
- a) $\frac{\partial y}{\partial x} + x^2 y = \sin y$ b) $(1 + y) \frac{\partial y}{\partial x} + \sin x = 0$
- c) $\frac{\partial y}{\partial x} - x^2 y = \sin x$ d) $\frac{\partial y}{\partial x} + y(y + x) = x^2$
- 10) The series $\sum_{n=1}^\infty \sin\left(\frac{1}{n}\right)$ is ____.
- a) convergent b) divergent
- c) oscillatory d) conditionally convergent
- 11) The series $\sum \frac{1}{n^{3/2}}$, is ____.
- a) convergent b) divergent
- c) oscillatory d) conditionally convergent
- 12) For the differential equation $Ndx + Mdy = 0$, the condition for exactness is ____.
- a) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ b) $\frac{\partial N}{\partial y} - \frac{\partial M}{\partial x} = 0$
- c) $\frac{\partial M}{\partial y} + \frac{\partial N}{\partial x} = 0$ d) $\frac{\partial N}{\partial y} + \frac{\partial M}{\partial x} = 0$
- 13) The orthogonal trajectory for the family $y^2 + x^2 = a^2$ is ____.
- a) Circles b) Ellipse
- c) Parabolas d) Straight line
- 14) Cauchy Riemann Equations for the function $f(z)$ to be analytic are ____.
- a) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$ b) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}$
- c) $\frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}$ d) $\frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$

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Set **Q**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTN10203)

Day & Date: Tuesday, 21-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I**Q.2 Attempt any three questions.****09**

a) $\frac{dy}{dx} = \frac{2x + 2y + 3}{y + x + 1}$

b) Test if the following series converges or diverges.

$$\sum_{n=1}^{\infty} (n+1)^{1/3} - n^{1/3}$$

c) Find the analytic function $f(z) = u + iv$ where $v = e^x \sin y$

d) Find the orthogonal Trajectory of $r = a(1 + \sin \theta)$

e) Test the convergence of the series $\frac{1}{3} + \left(\frac{2}{5}\right)^5 + \left(\frac{3}{7}\right)^3 + \dots$

Q.3 Attempt any three questions.**09**

a) Prove that $(1 + i\sqrt{3})^8 + (1 - i\sqrt{3})^8 = -2^8$

b) Solve $x^4 - x^3 + x^2 - x + 1 = 0$

c) Solve $(1 + y^2)dx = (e^{\tan^{-1} y} - x)dy$

d) Test if the following series for convergence or divergence

$$\left(\frac{1}{3}\right)^2 + \left(\frac{1.2}{3.50}\right)^2 + \left(\frac{1.2.3}{3.5.7}\right)^2 + \dots$$

e) Solve $(\sec x \tan x \tan y - e^x)dx + (\sec x \sec^2 y)dy = 0$

Q.4 Attempt any two questions.**10**

a) In a single closed circuit the current I at time t is given by $R \frac{dq}{dt} + \frac{q}{c} = E$. Find the current " i " at time t , given that at $t = 0$ $i = 0$ and $q = 0$, also E, L, R are constants.

b) Find the n th roots of unity. Show that the roots are in G.P., their sum is zero and product is $(-1)^{n-1}$

c) Test the series for Absolute or Conditional convergence

$$\frac{2}{3} - \frac{3}{4} + \frac{1}{2} - \frac{4}{5} + \frac{1}{3} - \frac{5}{6} + \dots$$

Section – II

Q.5 Solve any three of the following questions.**09**

- a) Evaluate $\int_0^{\infty} x^5 5^{-x} dx$
- b) Evaluate $\int_0^{\infty} \frac{\tan^{-1}\left(\frac{x}{a}\right) - \tan^{-1}\left(\frac{x}{b}\right)}{x} dx$
- c) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x \, dz dx dy$
- d) Trace the curve $x = a(t - \sin t), y = a(1 + \cos t)$ with full justification.
- e) Find the area which is inside the cardioid $r = 2(1 + \cos \theta)$ and outside the circle $r = 2$

Q.6 Solve any three of the following questions.**09**

- a) Evaluate $\int_0^2 x^4 (8 - x^3)^{-\frac{1}{3}} dx$
- b) Trace the following curves with full justification $r = a \cos 3\theta$
- c) Find the mass of the lamina bounded by the $y^2 = ax$ and $x^2 = ay$, if density of the lamina at a point varies as the square of its distance from the origin.
- d) Evaluate $\iint_R (x^2 + y^2) dx dy$ over the area of triangle whose vertices are $(0,1), (1,1), (1,2)$
- e) Change to polar co-ordinate system and evaluate $\int_0^a \int_y^a \frac{x^2 dx dy}{(x^2 + y^2)^{\frac{1}{2}}}$

Q.7 Solve any two of the following questions.**10**

- a) Change the order of integration and evaluate $\int_0^{\infty} \int_0^x e^{\frac{-x^2}{y}} x \, dx dy$
- b) Trace the following curves with full justification $xy^2 = a(x^2 - a^2)$
- c) Prove that $\int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx = B(m, n)$ and hence evaluate $\int_0^{\infty} \frac{\sqrt{x}}{(1+x)^2} dx$

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Set R

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTN10203)

Day & Date: Tuesday, 21-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative.

14

- 1) For the curve $r = a \sin 3\theta$ the equations of tangents at the pole are _____.

a) $\theta = \frac{\pi}{2}, \frac{\pi}{3}, \frac{2\pi}{3}, \dots$

b) $\theta = \frac{\pi}{4}, \frac{2\pi}{4}, \frac{3\pi}{4}, \dots$

c) $\theta = \frac{\pi}{3}, \frac{2\pi}{3}, \pi, \dots$

d) $\theta = 0, \pi, 3\pi, \dots$

- 2) The value of $\int_0^1 \int_0^{\pi/2} r \sin \theta \, d\theta \, dr =$ _____.

a) $\frac{1}{2}$

b) $\frac{\pi}{2}$

c) 0

d) $\frac{-1}{2}$

- 3) Area bounded by two plane curves $y = f_1(x), y = f_2(x)$ $x = a, x = b$ is given by _____.

a) $\int_a^b \int_c^d dx \, dy$

b) $\int_a^b \int_c^d x \, dy \, dx$

c) $\int_a^b \int_{f_1(x)}^{f_2(x)} dx \, dy$

d) $\int_a^b \int_c^d y \, dx \, dy$

- 4) For $\int_0^\infty \int_x^\infty f(x, y) \, dy \, dx$ by the change of order of integration, we get _____.

a) $\int_0^\infty \int_0^x f(x, y) \, dx \, dy$

b) $\int_x^\infty \int_0^\infty f(x, y) \, dx \, dy$

c) $\int_0^\infty \int_y^\infty f(x, y) \, dx \, dy$

d) $\int_0^\infty \int_0^y f(x, y) \, dx \, dy$

- 5) $\cos(ix)$ is equal to _____.

a) $i \cos x$

b) $-i \cosh x$

c) $\cosh x$

d) $i \sinh x$

- 6) Which of the following differential equation is linear?
- a) $\frac{\partial y}{\partial x} + x^2 y = \sin y$ b) $(1 + y) \frac{\partial y}{\partial x} + \sin x = 0$
- c) $\frac{\partial y}{\partial x} - x^2 y = \sin x$ d) $\frac{\partial y}{\partial x} + y(y + x) = x^2$
- 7) The series $\sum_{n=1}^{\infty} \sin\left(\frac{1}{n}\right)$ is ____.
- a) convergent b) divergent
- c) oscillatory d) conditionally convergent
- 8) The series $\sum \frac{1}{n^{3/2}}$, is ____.
- a) convergent b) divergent
- c) oscillatory d) conditionally convergent
- 9) For the differential equation $Ndx + Mdy = 0$, the condition for exactness is ____.
- a) $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$ b) $\frac{\partial N}{\partial y} - \frac{\partial M}{\partial x} = 0$
- c) $\frac{\partial M}{\partial y} + \frac{\partial N}{\partial x} = 0$ d) $\frac{\partial N}{\partial y} + \frac{\partial M}{\partial x} = 0$
- 10) The orthogonal trajectory for the family $y^2 + x^2 = a^2$ is ____.
- a) Circles b) Ellipse
- c) Parabolas d) Straight line
- 11) Cauchy Riemann Equations for the function $f(z)$ to be analytic are ____.
- a) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$ b) $\frac{\partial u}{\partial x} = \frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}$
- c) $\frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = \frac{\partial v}{\partial x}$ d) $\frac{\partial u}{\partial x} = -\frac{\partial v}{\partial y}, \frac{\partial u}{\partial y} = -\frac{\partial v}{\partial x}$
- 12) The value of $B\left[\frac{5}{2}, \frac{1}{2}\right]$ is ____.
- a) $\frac{\pi}{3}$ b) $\frac{\pi}{8}$
- c) $\frac{3\pi}{8}$ d) $\frac{8\pi}{3}$
- 13) Which of the following is not true?
- a) $\sqrt{\frac{1}{2}} = \sqrt{\pi}$ b) $\sqrt{\frac{1}{4}} \sqrt{\frac{3}{4}} = \sqrt{2\pi}$
- c) $\sqrt{n+1} = n\sqrt{n}$ d) $\sqrt{-2} = \infty$
- 14) For the curve $y^2(1+x) = x^2(1-x)$, the origin is a ____.
- a) node b) cusp
- c) conjugate point d) isolated point

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Set **R**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTN10203)

Day & Date: Tuesday, 21-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I**Q.2 Attempt any three questions.****09**

a) $\frac{dy}{dx} = \frac{2x + 2y + 3}{y + x + 1}$

b) Test if the following series converges or diverges.

$$\sum_{n=1}^{\infty} (n+1)^{1/3} - n^{1/3}$$

c) Find the analytic function $f(z) = u + iv$ where $v = e^x \sin y$

d) Find the orthogonal Trajectory of $r = a(1 + \sin \theta)$

e) Test the convergence of the series $\frac{1}{3} + \left(\frac{2}{5}\right)^5 + \left(\frac{3}{7}\right)^3 + \dots$

Q.3 Attempt any three questions.**09**

a) Prove that $(1 + i\sqrt{3})^8 + (1 - i\sqrt{3})^8 = -2^8$

b) Solve $x^4 - x^3 + x^2 - x + 1 = 0$

c) Solve $(1 + y^2)dx = (e^{\tan^{-1} y} - x)dy$

d) Test if the following series for convergence or divergence

$$\left(\frac{1}{3}\right)^2 + \left(\frac{1.2}{3.50}\right)^2 + \left(\frac{1.2.3}{3.5.7}\right)^2 + \dots$$

e) Solve $(\sec x \tan x \tan y - e^x)dx + (\sec x \sec^2 y)dy = 0$

Q.4 Attempt any two questions.**10**

a) In a single closed circuit the current I at time t is given by $R \frac{dq}{dt} + \frac{q}{c} = E$. Find the current " i " at time t , given that at $t = 0$ $i = 0$ and $q = 0$, also E, L, R are constants.

b) Find the n th roots of unity. Show that the roots are in G.P., their sum is zero and product is $(-1)^{n-1}$

c) Test the series for Absolute or Conditional convergence

$$\frac{2}{3} - \frac{3}{4} + \frac{1}{2} - \frac{4}{5} + \frac{1}{3} - \frac{5}{6} + \dots$$

Section – II

Q.5 Solve any three of the following questions.**09**

a) Evaluate $\int_0^{\infty} x^5 5^{-x} dx$

b) Evaluate $\int_0^{\infty} \frac{\tan^{-1}\left(\frac{x}{a}\right) - \tan^{-1}\left(\frac{x}{b}\right)}{x} dx$

c) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x \, dz dx dy$

d) Trace the curve $x = a(t - \sin t), y = a(1 + \cos t)$ with full justification.

e) Find the area which is inside the cardioid $r = 2(1 + \cos \theta)$ and outside the circle $r = 2$

Q.6 Solve any three of the following questions.**09**

a) Evaluate $\int_0^2 x^4 (8 - x^3)^{-\frac{1}{3}} dx$

b) Trace the following curves with full justification $r = a \cos 3\theta$

c) Find the mass of the lamina bounded by the $y^2 = ax$ and $x^2 = ay$, if density of the lamina at a point varies as the square of its distance from the origin.

d) Evaluate $\iint_R (x^2 + y^2) dx dy$ over the area of triangle whose vertices are $(0,1), (1,1), (1,2)$

e) Change to polar co-ordinate system and evaluate $\int_0^a \int_y^a \frac{x^2 dx dy}{(x^2 + y^2)^{\frac{1}{2}}}$

Q.7 Solve any two of the following questions.**10**

a) Change the order of integration and evaluate $\int_0^{\infty} \int_0^x e^{\frac{-x^2}{y}} x \, dx dy$

b) Trace the following curves with full justification $xy^2 = a(x^2 - a^2)$

c) Prove that $\int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx = B(m, n)$ and hence evaluate

$$\int_0^{\infty} \frac{\sqrt{x}}{(1+x)^2} dx$$

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Max. Marks: 70

Marks: 14

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Set **S**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Mathematics – II (BTN10203)

Day & Date: Tuesday, 21-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I**Q.2 Attempt any three questions.****09**

a) $\frac{dy}{dx} = \frac{2x + 2y + 3}{y + x + 1}$

b) Test if the following series converges or diverges.

$$\sum_{n=1}^{\infty} (n+1)^{1/3} - n^{1/3}$$

c) Find the analytic function $f(z) = u + iv$ where $v = e^x \sin y$

d) Find the orthogonal Trajectory of $r = a(1 + \sin \theta)$

e) Test the convergence of the series $\frac{1}{3} + \left(\frac{2}{5}\right)^5 + \left(\frac{3}{7}\right)^3 + \dots$

Q.3 Attempt any three questions.**09**

a) Prove that $(1 + i\sqrt{3})^8 + (1 - i\sqrt{3})^8 = -2^8$

b) Solve $x^4 - x^3 + x^2 - x + 1 = 0$

c) Solve $(1 + y^2)dx = (e^{\tan^{-1} y} - x)dy$

d) Test if the following series for convergence or divergence

$$\left(\frac{1}{3}\right)^2 + \left(\frac{1.2}{3.50}\right)^2 + \left(\frac{1.2.3}{3.5.7}\right)^2 + \dots$$

e) Solve $(\sec x \tan x \tan y - e^x)dx + (\sec x \sec^2 y)dy = 0$

Q.4 Attempt any two questions.**10**

a) In a single closed circuit the current I at time t is given by $R \frac{dq}{dt} + \frac{q}{c} = E$. Find the current " i " at time t , given that at $t = 0$ $i = 0$ and $q = 0$, also E, L, R are constants.

b) Find the n th roots of unity. Show that the roots are in G.P., their sum is zero and product is $(-1)^{n-1}$

c) Test the series for Absolute or Conditional convergence

$$\frac{2}{3} - \frac{3}{4} + \frac{1}{2} - \frac{4}{5} + \frac{1}{3} - \frac{5}{6} + \dots$$

Section – II

Q.5 Solve any three of the following questions.**09**

a) Evaluate $\int_0^{\infty} x^5 5^{-x} dx$

b) Evaluate $\int_0^{\infty} \frac{\tan^{-1}\left(\frac{x}{a}\right) - \tan^{-1}\left(\frac{x}{b}\right)}{x} dx$

c) Evaluate $\int_0^1 \int_{y^2}^1 \int_0^{1-x} x \, dz dx dy$

d) Trace the curve $x = a(t - \sin t), y = a(1 + \cos t)$ with full justification.

e) Find the area which is inside the cardioid $r = 2(1 + \cos \theta)$ and outside the circle $r = 2$

Q.6 Solve any three of the following questions.**09**

a) Evaluate $\int_0^2 x^4 (8 - x^3)^{-\frac{1}{3}} dx$

b) Trace the following curves with full justification $r = a \cos 3\theta$

c) Find the mass of the lamina bounded by the $y^2 = ax$ and $x^2 = ay$, if density of the lamina at a point varies as the square of its distance from the origin.

d) Evaluate $\iint_R (x^2 + y^2) dx dy$ over the area of triangle whose vertices are $(0,1), (1,1), (1,2)$

e) Change to polar co-ordinate system and evaluate $\int_0^a \int_y^a \frac{x^2 dx dy}{(x^2 + y^2)^{\frac{1}{2}}}$

Q.7 Solve any two of the following questions.**10**

a) Change the order of integration and evaluate $\int_0^{\infty} \int_0^x e^{\frac{-x^2}{y}} x \, dx dy$

b) Trace the following curves with full justification $xy^2 = a(x^2 - a^2)$

c) Prove that $\int_0^{\infty} \frac{x^{m-1}}{(1+x)^{m+n}} dx = B(m, n)$ and hence evaluate

$$\int_0^{\infty} \frac{\sqrt{x}}{(1+x)^2} dx$$

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- 9) The substances that rotate the plane of polarization are said to be _____.
a) opaque b) optically inactive
c) optically active d) Polaroid
- 10) Stimulated emission process is represented by equation _____.
a) $A + h\nu \rightarrow A^*$ b) $A^* + h\nu \rightarrow A + 2h\nu$
c) $A^* \rightarrow A + h\nu$ d) $A^* + h\nu \rightarrow A + h\nu$
- 11) The hologram records _____ of the object.
a) Both intensity variation & phase distribution
b) Only phase distribution
c) Only intensity variation
d) None of these
- 12) In total internal reflection phenomenon the light ray incident from _____.
a) Rarer to denser b) Rarer to rarer
c) Denser to denser d) Denser to rarer
- 13) The numerical aperture is given by the equation _____.
a) $NA = \sqrt{(n_1^2 + n_2^2)}$ b) $NA = \sqrt{(n_1^2 - n_2^2)}$
c) $NA = \sqrt{(n_1^2 - n_2^2)}$ d) $NA = \sqrt{(n_2^2 - n_1^2)}$
- 14) The chirality of zigzag CNT is _____.
a) (a, b) b) (a, 0)
c) (a, a) d) (0, b)

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Physics (BTN10201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any SIX of the following. **18**

- a) Derive that Fermi level in an intrinsic semiconductor lies half way between a valence band & conduction band.
- b) Explain in detail Bragg's law.
- c) What are the acoustic requirements of a good auditorium?
- d) What is piezo-electric effect & magneto-striction effect?
- e) Derive the expression of length contraction.
- f) Derive Einstein's expression for mass-energy equivalence.
- g) A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B=1.5 \text{ wb/m}^2$ If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$
- h) Calculate the interplanar spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .

Q.3 Attempt any TWO of the following: **10**

- a) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- b) Explain the term Miller indices. Derive the relation between lattice constant & interplaner spacing for cubic crystal $d = \frac{a}{\sqrt{h^2+k^2+l^2}}$
- c) For an empty assembly hall of size $20 \times 15 \times 10 \text{ m}^3$ the reverberation time is 3.5 s. calculate the average absorption coefficient of the hall. What area of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
- d) Derive the expression for Lorentz transformation equations & its inverse.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain Rayleigh's criterion of resolution.
- b) Define
 - i) Spontaneous emission
 - ii) Stimulated emission
- c) Write applications of LASER.
- d) Write a note on: Classification of optical fibers.
- e) State properties of matter waves.
- f) Write applications of nanotechnology.
- g) A grating has 100 lines ruled on it. What is the difference between two wavelength that just appear separated in the second order spectrum in the region $\lambda = 6000 \text{Å}$.
- h) Calculate the numerical aperture of an optical fiber cable with refractive index of core $n_1 = 1.45$ and refractive index of cladding $n_2 = 1.41$.

Q.5 Attempt any TWO of the following.**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.28 nm. Given $h = 6.634 \times 10^{-34} \text{ J.s}$ and $m = 1.66 \times 10^{-27} \text{ kg}$.

**Seat
No.**

Max. Marks: 70

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
2) Velocity of light, $c = 3 \times 10^8$ m/sec.
3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

Marks: 14

14

- 1) The resolving power of a grating having N slits in nth order will be _____.
a) (n+N) b) (n-N)
c) n/N d) n.N
- 2) The substances that rotate the plane of polarization are said to be _____.
a) opaque b) optically inactive
c) optically active d) Polaroid
- 3) Stimulated emission process is represented by equation _____.
a) $A + h\nu \rightarrow A^*$ b) $A^* + h\nu \rightarrow A + 2h\nu$
c) $A^* \rightarrow A + h\nu$ d) $A^* + h\nu \rightarrow A + h\nu$
- 4) The hologram records _____ of the object.
a) Both intensity variation & phase distribution
b) Only phase distribution
c) Only intensity variation
d) None of these
- 5) In total internal reflection phenomenon the light ray incident from _____.
a) Rarer to denser b) Rarer to rarer
c) Denser to denser d) Denser to rarer
- 6) The numerical aperture is given by the equation _____.
a) $NA = \sqrt{(n_1)^2 + n_2^2}$ b) $NA = (n_1^2 - n_2^2)$
c) $NA = \sqrt{(n_1^2 - n_2^2)}$ d) $NA = \sqrt{(n_2^2 - n_1^2)}$
- 7) The chirality of zigzag CNT is _____.
a) (a, b) b) (a, 0)
c) (a, a) d) (0, b)
- 8) Acceptor type semiconductor is formed by adding impurity of valency _____.
a) 3 b) 4
c) 5 d) 2

- 9) The number of died axes symmetry elements that are present in a cubic crystal are _____.
a) 4
b) 6
c) 8
d) 10
- 10) The Miller indices of the plane parallel to x&y axes are _____.
a) (1 0 0)
b) (0 1 0)
c) (0 0 1)
d) (1 1 1)
- 11) The human audible frequency range is _____.
a) 20 KHz to 20 MHz
b) 200 KHz to 200 MHz
c) 200 Hz to 200 MHz
d) 20 Hz to 20 KHz
- 12) Reverberation time is _____ to volume of the hall.
a) directly proportional
b) inversely proportional
c) independent
d) none of these
- 13) The non-inertial frame of reference is _____ frame of reference.
a) Non-accelerated
b) An accelerated
c) A rotating
d) None of these
- 14) The Lorentz transformation equation for x' co-ordinate from s to s' _____.
a) $x' = (x + vt)/\sqrt{1 - v^2/c^2}$
b) $x' = (x - ct)/1 - v^2/c^2$
c) $x' = (x - vt)/\sqrt{1 - v^2/c^2}$
d) $x' = x - vt(\sqrt{1 - v^2/c^2})$

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Physics (BTN10201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any SIX of the following. **18**

- a) Derive that Fermi level in an intrinsic semiconductor lies half way between a valence band & conduction band.
- b) Explain in detail Bragg's law.
- c) What are the acoustic requirements of a good auditorium?
- d) What is piezo-electric effect & magneto-striction effect?
- e) Derive the expression of length contraction.
- f) Derive Einstein's expression for mass-energy equivalence.
- g) A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B=1.5 \text{ wb/m}^2$. If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$.
- h) Calculate the interplanar spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .

Q.3 Attempt any TWO of the following: **10**

- a) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- b) Explain the term Miller indices. Derive the relation between lattice constant & interplanar spacing for cubic crystal $d = \frac{a}{\sqrt{h^2 + k^2 + l^2}}$.
- c) For an empty assembly hall of size $20 \times 15 \times 10 \text{ m}^3$ the reverberation time is 3.5 s. calculate the average absorption coefficient of the hall. What area of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
- d) Derive the expression for Lorentz transformation equations & its inverse.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain Rayleigh's criterion of resolution.
- b) Define
 - i) Spontaneous emission
 - ii) Stimulated emission
- c) Write applications of LASER.
- d) Write a note on: Classification of optical fibers.
- e) State properties of matter waves.
- f) Write applications of nanotechnology.
- g) A grating has 100 lines ruled on it. What is the difference between two wavelength that just appear separated in the second order spectrum in the region $\lambda = 6000 \text{Å}$.
- h) Calculate the numerical aperture of an optical fiber cable with refractive index of core $n_1 = 1.45$ and refractive index of cladding $n_2 = 1.41$.

Q.5 Attempt any TWO of the following.**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.28 nm. Given $h = 6.634 \times 10^{-34} \text{ J.s}$ and $m = 1.66 \times 10^{-27} \text{ kg}$.

Seat No.	
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F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Physics (BTN10201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicate full marks.
 4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The hologram records _____ of the object.
 - a) Both intensity variation & phase distribution
 - b) Only phase distribution
 - c) Only intensity variation
 - d) None of these
- 2) In total internal reflection phenomenon the light ray incident from _____.
 - a) Rarer to denser
 - b) Rarer to rarer
 - c) Denser to denser
 - d) Denser to rarer
- 3) The numerical aperture is given by the equation _____.
 - a) $NA = \sqrt{(n_1^2 + n_2^2)}$
 - b) $NA = \sqrt{(n_1^2 - n_2^2)}$
 - c) $NA = \sqrt{(n_1^2 - n_2^2)}$
 - d) $NA = \sqrt{(n_2^2 - n_1^2)}$
- 4) The chirality of zigzag CNT is _____.
 - a) (a, b)
 - b) (a, 0)
 - c) (a, a)
 - d) (0, b)
- 5) Acceptor type semiconductor is formed by adding impurity of valency _____.
 - a) 3
 - b) 4
 - c) 5
 - d) 2
- 6) The number of died axes symmetry elements that are present in a cubic crystal are _____.
 - a) 4
 - b) 6
 - c) 8
 - d) 10
- 7) The Miller indices of the plane parallel to x&y axes are _____.
 - a) (1 0 0)
 - b) (0 1 0)
 - c) (0 0 1)
 - d) (1 1 1)

- 8) The human audible frequency range is _____.
 a) 20 KHz to 20 MHz b) 200 KHz to 200 MHz
 c) 200 Hz to 200 MHz d) 20 Hz to 20 KHz
- 9) Reverberation time is _____ to volume of the hall.
 a) directly proportional b) inversely proportional
 c) independent d) none of these
- 10) The non-inertial frame of reference is _____ frame of reference.
 a) Non-accelerated b) An accelerated
 c) A rotating d) None of these
- 11) The Lorentz transformation equation for x' co-ordinate from s to s' _____.
 a) $x' = (x + vt)/\sqrt{1 - v^2/c^2}$ b) $x' = (x - ct)/1 - v^2/c^2$
 c) $x' = (x - vt)/\sqrt{1 - v^2/c^2}$ d) $x' = x - vt(\sqrt{1 - v^2/c^2})$
- 12) The resolving power of a grating having N slits in n^{th} order will be _____.
 a) $(n+N)$ b) $(n-N)$
 c) n/N d) $n.N$
- 13) The substances that rotate the plane of polarization are said to be _____.
 a) opaque b) optically inactive
 c) optically active d) Polaroid
- 14) Stimulated emission process is represented by equation _____.
 a) $A + h\gamma \rightarrow A^*$ b) $A^* + h\gamma \rightarrow A + 2h\gamma$
 c) $A^* \rightarrow A + h\gamma$ d) $A^* + h\gamma \rightarrow A + h\gamma$

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Physics (BTN10201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any SIX of the following. **18**

- a) Derive that Fermi level in an intrinsic semiconductor lies half way between a valence band & conduction band.
- b) Explain in detail Bragg's law.
- c) What are the acoustic requirements of a good auditorium?
- d) What is piezo-electric effect & magneto-striction effect?
- e) Derive the expression of length contraction.
- f) Derive Einstein's expression for mass-energy equivalence.
- g) A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B=1.5 \text{ wb/m}^2$ If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$
- h) Calculate the interplanar spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .

Q.3 Attempt any TWO of the following: **10**

- a) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- b) Explain the term Miller indices. Derive the relation between lattice constant & interplaner spacing for cubic crystal $d = \frac{a}{\sqrt{h^2+k^2+l^2}}$
- c) For an empty assembly hall of size $20 \times 15 \times 10 \text{ m}^3$ the reverberation time is 3.5 s. calculate the average absorption coefficient of the hall. What area of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
- d) Derive the expression for Lorentz transformation equations & its inverse.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain Rayleigh's criterion of resolution.
- b) Define
 - i) Spontaneous emission
 - ii) Stimulated emission
- c) Write applications of LASER.
- d) Write a note on: Classification of optical fibers.
- e) State properties of matter waves.
- f) Write applications of nanotechnology.
- g) A grating has 100 lines ruled on it. What is the difference between two wavelength that just appear separated in the second order spectrum in the region $\lambda = 6000 \text{Å}$.
- h) Calculate the numerical aperture of an optical fiber cable with refractive index of core $n_1 = 1.45$ and refractive index of cladding $n_2 = 1.41$.

Q.5 Attempt any TWO of the following.**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.28 nm. Given $h = 6.634 \times 10^{-34} \text{ J.s}$ and $m = 1.66 \times 10^{-27} \text{ kg}$.

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Physics (BTN10201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicate full marks.
 4) Make suitable assumptions, if necessary.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ / k.mol.
 2) Velocity of light, $c = 3 \times 10^8$ m/sec.
 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The non-inertial frame of reference is _____ frame of reference.
 - a) Non-accelerated
 - b) An accelerated
 - c) A rotating
 - d) None of these
- 2) The Lorentz transformation equation for x' co-ordinate from s to s' _____.
 - a) $x' = (x + vt)/\sqrt{1 - v^2/c^2}$
 - b) $x' = (x - ct)/1 - v^2/c^2$
 - c) $x' = (x - vt)/\sqrt{1 - v^2/c^2}$
 - d) $x' = x - vt(\sqrt{1 - v^2/c^2})$
- 3) The resolving power of a grating having N slits in n^{th} order will be _____.
 - a) $(n+N)$
 - b) $(n-N)$
 - c) n/N
 - d) $n.N$
- 4) The substances that rotate the plane of polarization are said to be _____.
 - a) opaque
 - b) optically inactive
 - c) optically active
 - d) Polaroid
- 5) Stimulated emission process is represented by equation _____.
 - a) $A + h\nu \rightarrow A^*$
 - b) $A^* + h\nu \rightarrow A + 2h\nu$
 - c) $A^* \rightarrow A + h\nu$
 - d) $A^* + h\nu \rightarrow A + h\nu$
- 6) The hologram records _____ of the object.
 - a) Both intensity variation & phase distribution
 - b) Only phase distribution
 - c) Only intensity variation
 - d) None of these
- 7) In total internal reflection phenomenon the light ray incident from _____.
 - a) Rarer to denser
 - b) Rarer to rarer
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- 8) The numerical aperture is given by the equation _____.
 - a) $NA = \sqrt{(n_1^2 + n_2^2)}$
 - b) $NA = (n_1^2 - n_2^2)$
 - c) $NA = \sqrt{(n_1^2 - n_2^2)}$
 - d) $NA = \sqrt{(n_2^2 - n_1^2)}$

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Physics (BTN10201)

Day & Date: Saturday, 25-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any SIX of the following. **18**

- a) Derive that Fermi level in an intrinsic semiconductor lies half way between a valence band & conduction band.
- b) Explain in detail Bragg's law.
- c) What are the acoustic requirements of a good auditorium?
- d) What is piezo-electric effect & magneto-striction effect?
- e) Derive the expression of length contraction.
- f) Derive Einstein's expression for mass-energy equivalence.
- g) A copper strip 2 cm wide and 1mm thick is placed in a magnetic field with $B=1.5 \text{ wb/m}^2$ If a current of 200 A is set up in the strip. Calculate hall voltage that appears across the strip if number of charge carriers is $8.4 \times 10^{28} / \text{m}^3$
- h) Calculate the interplanar spacing for (3 2 1) plane in a simple cube lattice where constant is 4.2 \AA .

Q.3 Attempt any TWO of the following: **10**

- a) What is Hall effect? Derive the relation for Hall voltage and Hall coefficient.
- b) Explain the term Miller indices. Derive the relation between lattice constant & interplaner spacing for cubic crystal $d = \frac{a}{\sqrt{h^2+k^2+l^2}}$
- c) For an empty assembly hall of size $20 \times 15 \times 10 \text{ m}^3$ the reverberation time is 3.5 s. calculate the average absorption coefficient of the hall. What area of the wall should be covered by the curtain so as to reduce the reverberation time to 2.5 s. Given the absorption coefficient of curtain cloth is 0.5.
- d) Derive the expression for Lorentz transformation equations & its inverse.

Section – II

Q.4 Attempt any SIX of the following:**18**

- a) Explain Rayleigh's criterion of resolution.
- b) Define
 - i) Spontaneous emission
 - ii) Stimulated emission
- c) Write applications of LASER.
- d) Write a note on: Classification of optical fibers.
- e) State properties of matter waves.
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- g) A grating has 100 lines ruled on it. What is the difference between two wavelength that just appear separated in the second order spectrum in the region $\lambda = 6000 \text{Å}$.
- h) Calculate the numerical aperture of an optical fiber cable with refractive index of core $n_1 = 1.45$ and refractive index of cladding $n_2 = 1.41$.

Q.5 Attempt any TWO of the following.**10**

- a) With neat diagram explain construction and working of Laurent's half shade polarimeter.
- b) Describe He-Ne laser with its construction and working.
- c) Obtain the expression for acceptance angle, acceptance cone, numerical aperture and fractional refractive index change of an optical fiber.
- d) Find the velocity and kinetic energy of a neutron with a De Broglie wavelength of 0.28 nm. Given $h = 6.634 \times 10^{-34} \text{ J.s}$ and $m = 1.66 \times 10^{-27} \text{ kg}$.

P

Max. Marks: 70

4) Draw neat and labeled diagrams wherever necessary.

Marks: 14

14

- Page 1 of 16

- 9) A fuel having high ignition temperature is _____.
a) Petrol
b) Wood
c) Kerosene
d) LPG
- 10) Calorific value of a solid fuel or non-volatile liquid fuel is found with the help of _____.
a) Junkers calorimeter
b) Bomb calorimeter
c) Boys calorimeter
d) Orsat apparatus
- 11) Structural units of high polymers, are called: _____.
a) fibres
b) thermo units
c) monomers
d) fabrics
- 12) A high molecular weight material that can easily be moulded into any desired shape is _____.
a) Graphite
b) Plastic
c) Gelly
d) Greases
- 13) Which of the following can be used for purification of substances?
a) IR spectroscopy
b) UV spectroscopy
c) Gas chromatography
d) Calorimetry
- 14) Which is the electrolyte used in Li-ion battery?
a) Lead dioxide
b) Lithium-based gel
c) Sulfur dioxide
d) Cobalt

Seat No.	
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Set

P

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10202)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	60.15	162
Mg(HCO ₃) ₂	58.73	146
MgSO ₄	14.10	120
CaCl ₂	23.90	111
CaSO ₄	15.60	136

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain types of liquid lubricants.
 d) Define lubrication. Explain mechanism of thick film lubrication.
 e) Define corrosion. List the types of corrosion? Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four:

12

- a) Define disinfection. Explain disinfection of water by chlorine.
 b) Define is COD. Explain determination of COD. Explain its significance.
 c) Explain characteristics of batteries.
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 3.1 ml of N/10 KOH solution calculate its acid value.
 e) Define following terms
 i) Oiliness
 ii) Acid value
 iii) Viscosity Index
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:**16**

- a) Define alloy. Explain purpose of alloying.
 b) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of coal burnt	= 0.85 g
Weight of water taken	= 2100 g
Water equivalent of bomb and calorimeter	= 500 g
Rise in temperature	= 2.48°C
Cooling correction	= 0.02°C
Fuse wire correction	= 10 cal.
Acid correction	= 60 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587 kcal/kg)

- c) Explain construction and working of Boy's calorimeter.
 d) Explain molding of plastics in to articles by following methods.
 i) Compression molding
 ii) Extrusion molding
 e) Explain properties and applications of Thiokol rubber and BUNA-S rubber.
 f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:**12**

- a) Explain composition, properties and applications of steel.
 b) Define Fuel. Explain classification of fuels.
 c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
 d) Define Chromatography. Write applications of GLC.
 e) A polymer has following population.
 15 molecules have molecular weight each 25000
 25 molecules have molecular weight each 27500
 20 molecules have molecular weight each 29000
 40 molecules have molecular weight each 32000
 Calculate its number average molecular weight.
 f) Calculate weight of MgSO_4 required to prepare 0.1M 100 ml solution.
 (Mol. Wt. of MgSO_4 = 120)

Seat No.	
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F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10202)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Draw neat and labeled diagrams wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Annealing of glass is: _____.
 a) cooling glass articles rapidly
 b) passing molten glass between rollers
 c) allowing glass articles to cool gradually
 d) plunging glass articles suddenly into water
- 2) A fuel having high ignition temperature is _____.
 a) Petrol
 b) Wood
 c) Kerosene
 d) LPG
- 3) Calorific value of a solid fuel or non-volatile liquid fuel is found with the help of _____.
 a) Junkers calorimeter
 b) Bomb calorimeter
 c) Boys calorimeter
 d) Orsat apparatus
- 4) Structural units of high polymers, are called: _____.
 a) fibres
 b) thermo units
 c) monomers
 d) fabrics
- 5) A high molecular weight material that can easily be moulded into any desired shape is _____.
 a) Graphite
 b) Plastic
 c) Gelly
 d) Greases
- 6) Which of the following can be used for purification of substances?
 a) IR spectroscopy
 b) UV spectroscopy
 c) Gas chromatography
 d) Calorimetry
- 7) Which is the electrolyte used in Li-ion battery?
 a) Lead dioxide
 b) Lithium-based gel
 c) Sulfur dioxide
 d) Cobalt
- 8) Brackish water mostly contains dissolved: _____.
 a) Ca salts
 b) Mg salts
 c) NaCl
 d) Suspended impurities

- 9) Alkalinity in water cannot be due to the presence of: _____.
a) OH^- only
b) OH^- and CO_3^{--}
c) OH^- and HCO_3^-
d) CO_3^{--} and HCO_3^-
- 10) A good lubricant should have: _____.
a) low viscosity index
b) high viscosity index
c) low fire point
d) high volatility
- 11) Animal and vegetable oils are: _____.
a) very cheap
b) not oxidized easily
c) not thickened in use
d) good in oiliness
- 12) During electrochemical corrosion in acidic environment: _____.
a) oxygen evolution occurs
b) oxygen absorption occurs
c) hydrogen evolution takes place
d) hydrogen absorption takes place
- 13) The process of zinc coating over iron sheet by hot dipping is called _____.
a) Galvanizing
b) Tinning
c) Sheradizing
d) Anodizing
- 14) Purest form of iron is: _____.
a) steel
b) wrought iron
c) pig iron
d) cast iron

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10202)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	60.15	162
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CaSO ₄	15.60	136

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain types of liquid lubricants.
 d) Define lubrication. Explain mechanism of thick film lubrication.
 e) Define corrosion. List the types of corrosion? Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four:

12

- a) Define disinfection. Explain disinfection of water by chlorine.
 b) Define is COD. Explain determination of COD. Explain its significance.
 c) Explain characteristics of batteries.
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 3.1 ml of N/10 KOH solution calculate its acid value.
 e) Define following terms
 i) Oiliness
 ii) Acid value
 iii) Viscosity Index
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:

16

- a) Define alloy. Explain purpose of alloying.
- b) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of coal burnt	= 0.85 g
Weight of water taken	= 2100 g
Water equivalent of bomb and calorimeter	= 500 g
Rise in temperature	= 2.48°C
Cooling correction	= 0.02°C
Fuse wire correction	= 10 cal.
Acid correction	= 60 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587 kcal/kg)

- c) Explain construction and working of Boy's calorimeter.
- d) Explain molding of plastics in to articles by following methods.
- Compression molding
 - Extrusion molding
- e) Explain properties and applications of Thiokol rubber and BUNA-S rubber.
- f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:

12

- a) Explain composition, properties and applications of steel.
- b) Define Fuel. Explain classification of fuels.
- c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
- d) Define Chromatography. Write applications of GLC.
- e) A polymer has following population.
- | | |
|---|-------|
| 15 molecules have molecular weight each | 25000 |
| 25 molecules have molecular weight each | 27500 |
| 20 molecules have molecular weight each | 29000 |
| 40 molecules have molecular weight each | 32000 |
- Calculate its number average molecular weight.
- f) Calculate weight of MgSO_4 required to prepare 0.1M 100 ml solution. (Mol. Wt. of MgSO_4 = 120)

Seat No.	
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Day & Date: Monday, 27-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.

- ### MCQ/Objective Type Questions

Marks: 14

14

- Page 9 of 16

- 9) During electrochemical corrosion in acidic environment: _____.
a) oxygen evolution occurs
b) oxygen absorption occurs
c) hydrogen evolution takes place
d) hydrogen absorption takes place
- 10) The process of zinc coating over iron sheet by hot dipping is called _____.
a) Galvanizing
b) Tinning
c) Sheradizing
d) Anodizing
- 11) Purest form of iron is: _____.
a) steel
b) wrought iron
c) pig iron
d) cast iron
- 12) Annealing of glass is: _____.
a) cooling glass articles rapidly
b) passing molten glass between rollers
c) allowing glass articles to cool gradually
d) plunging glass articles suddenly into water
- 13) A fuel having high ignition temperature is _____.
a) Petrol
b) Wood
c) Kerosene
d) LPG
- 14) Calorific value of a solid fuel or non-volatile liquid fuel is found with the help of _____.
a) Junkers calorimeter
b) Bomb calorimeter
c) Boys calorimeter
d) Orsat apparatus

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10202)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	60.15	162
Mg(HCO ₃) ₂	58.73	146
MgSO ₄	14.10	120
CaCl ₂	23.90	111
CaSO ₄	15.60	136

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain types of liquid lubricants.
 d) Define lubrication. Explain mechanism of thick film lubrication.
 e) Define corrosion. List the types of corrosion? Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four:

12

- a) Define disinfection. Explain disinfection of water by chlorine.
 b) Define is COD. Explain determination of COD. Explain its significance.
 c) Explain characteristics of batteries.
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 3.1 ml of N/10 KOH solution calculate its acid value.
 e) Define following terms
 i) Oiliness
 ii) Acid value
 iii) Viscosity Index
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:

16

- a) Define alloy. Explain purpose of alloying.
- b) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of coal burnt	= 0.85 g
Weight of water taken	= 2100 g
Water equivalent of bomb and calorimeter	= 500 g
Rise in temperature	= 2.48°C
Cooling correction	= 0.02°C
Fuse wire correction	= 10 cal.
Acid correction	= 60 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587 kcal/kg)

- c) Explain construction and working of Boy's calorimeter.
- d) Explain molding of plastics in to articles by following methods.
- Compression molding
 - Extrusion molding
- e) Explain properties and applications of Thiokol rubber and BUNA-S rubber.
- f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:

12

- a) Explain composition, properties and applications of steel.
- b) Define Fuel. Explain classification of fuels.
- c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
- d) Define Chromatography. Write applications of GLC.
- e) A polymer has following population.
- | | |
|---|-------|
| 15 molecules have molecular weight each | 25000 |
| 25 molecules have molecular weight each | 27500 |
| 20 molecules have molecular weight each | 29000 |
| 40 molecules have molecular weight each | 32000 |
- Calculate its number average molecular weight.
- f) Calculate weight of MgSO_4 required to prepare 0.1M 100 ml solution. (Mol. Wt. of MgSO_4 = 120)

Seat No.	
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Day & Date: Monday, 27-05-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Draw neat and labeled diagrams wherever necessary.

Marks: 14

14

- Page 13 of 16

Seat No.	
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Set **S**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Chemistry (BTN10202)

Day & Date: Monday, 27-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.
 2) Figures to the right indicates full marks.
 3) Draw neat and labelled diagrams wherever necessary.

Section – I

Q.2 Attempt any Four:

16

- a) A sample of water on analysis was found to contain the following impurities in mg/lit:

	Amount	Mo. Wt.
Ca(HCO ₃) ₂	60.15	162
Mg(HCO ₃) ₂	58.73	146
MgSO ₄	14.10	120
CaCl ₂	23.90	111
CaSO ₄	15.60	136

Calculate the temporary, permanent and total hardness of water in mg/lit.

- b) Define desalination. Explain desalination of water by reverse osmosis process.
 c) Explain types of liquid lubricants.
 d) Define lubrication. Explain mechanism of thick film lubrication.
 e) Define corrosion. List the types of corrosion? Explain mechanism of oxidation corrosion.
 f) Describe cathodic protection in corrosion control.

Q.3 Attempt any Four:

12

- a) Define disinfection. Explain disinfection of water by chlorine.
 b) Define is COD. Explain determination of COD. Explain its significance.
 c) Explain characteristics of batteries.
 d) In acid value determination of a lubricating oil 5 gm of oil sample required 3.1 ml of N/10 KOH solution calculate its acid value.
 e) Define following terms
 i) Oiliness
 ii) Acid value
 iii) Viscosity Index
 f) Explain prevention of corrosion by tinning.

Section – II

Q.4 Attempt any Four:**16**

- a) Define alloy. Explain purpose of alloying.
 b) A sample of coal containing 5% H, when tested in the laboratory for its calorific value in the bomb calorimeter, the following data were obtained:

Weight of coal burnt	= 0.85 g
Weight of water taken	= 2100 g
Water equivalent of bomb and calorimeter	= 500 g
Rise in temperature	= 2.48°C
Cooling correction	= 0.02°C
Fuse wire correction	= 10 cal.
Acid correction	= 60 cal

Calculate the gross and net calorific value of the coal in cal/g. (Take latent heat of condensation of steam = 587 kcal/kg)

- c) Explain construction and working of Boy's calorimeter.
 d) Explain molding of plastics in to articles by following methods.
 i) Compression molding
 ii) Extrusion molding
 e) Explain properties and applications of Thiokol rubber and BUNA-S rubber.
 f) Explain how components of mixture are separated by GLC.

Q.5 Attempt any Four:**12**

- a) Explain composition, properties and applications of steel.
 b) Define Fuel. Explain classification of fuels.
 c) Explain vulcanization of natural rubber. List advantages of vulcanized rubber.
 d) Define Chromatography. Write applications of GLC.
 e) A polymer has following population.
 15 molecules have molecular weight each 25000
 25 molecules have molecular weight each 27500
 20 molecules have molecular weight each 29000
 40 molecules have molecular weight each 32000
 Calculate its number average molecular weight.
 f) Calculate weight of MgSO_4 required to prepare 0.1M 100 ml solution.
 (Mol. Wt. of MgSO_4 = 120)

Seat No.	
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Set **P**

F.Y. (B.Tech.) (Sem - II) (Old) (CBCS) Examination: March/April-2024
Engineering Graphics & CAD (BTN10206)

Day & Date: Wednesday, 29-05-2024

Max. Marks: 70

Time: 10:00 AM To 02:00 PM

- Instructions:**
- 1) All questions from each section are compulsory.
 - 2) Figures to the right indicates full marks.
 - 3) Retain all construction lines.
 - 4) Assume suitable dimensions, wherever required and mention it clearly.
 - 5) All dimensions are in 'mm'.
 - 6) Return all the answer-sheet supplied irrespective of their use.

Note: Objective type question Paper must be returned after first 40 minutes strictly.

Section – I

Duration: 40 Minutes

Marks: 14

- Q.1 Solve any four (objective type) 14**
- 1. Attempt any two questions from a) to d)**
 - 2. Questions e) & f) are compulsory.**
- a) Refer Fig. (A):** Draw the projections of line AB 70 mm long makes an angle 40° & 50° with H.P & V.P. Find its apparent inclinations with HP & VP. **03**
 - b) Refer FIG. (B):** Complete the projections, if Line AB is parallel to Line CD & have equal length. **03**
 - c) Refer FIG. (C):** Complete the projections, if KS is perpendicular to line AB, where S lies on line AB. Find TL of Line KS. **03**
 - d) Refer FIG. (D):** Complete the projections, Horizontal Line MN intersecting line PQ. **03**
 - e) Refer FIG. (E):** Complete the projections of plane RST, and find its Dip and Strike of plane. **04**
 - f) Refer FIG. (F):** Complete the top view of a plane UVW, if it strikes S 45° W and dip 45° South Easterly. **04**

Descriptive Type Questions**Q.2 Solve the following**

- a) Draw the projection of line RS 70 mm long and making 40° with V.P, the front view of line makes an angle of 50° with H.P. Consider point 'R' is 15 mm away from H.P and V.P. Draw the projection of the line & find the angle made by line with H. P. **04**
- b) Complete the projections of line AB if **03**
- i) its bearing is S 45° E w.r.t. A
 - ii) its gradient is + 75% w.r.t. A
 - iii) its top view length is 60 mm
- Point A is 15mm from both HP and VP. Find TL of AB?
- c) A pentagonal plate of side 30 mm is placed with one side on the HP and the surface inclined at 50° to HP and perpendicular to VP. Draw the projection of lamina. **04**

- Q.3** A Rectangular plane 30 mm and 50 mm sides is resting in HP on one small side which is at 30° inclined to VP. While the surface of the plane makes at 45° inclination with HP. Draw its projections. **07**

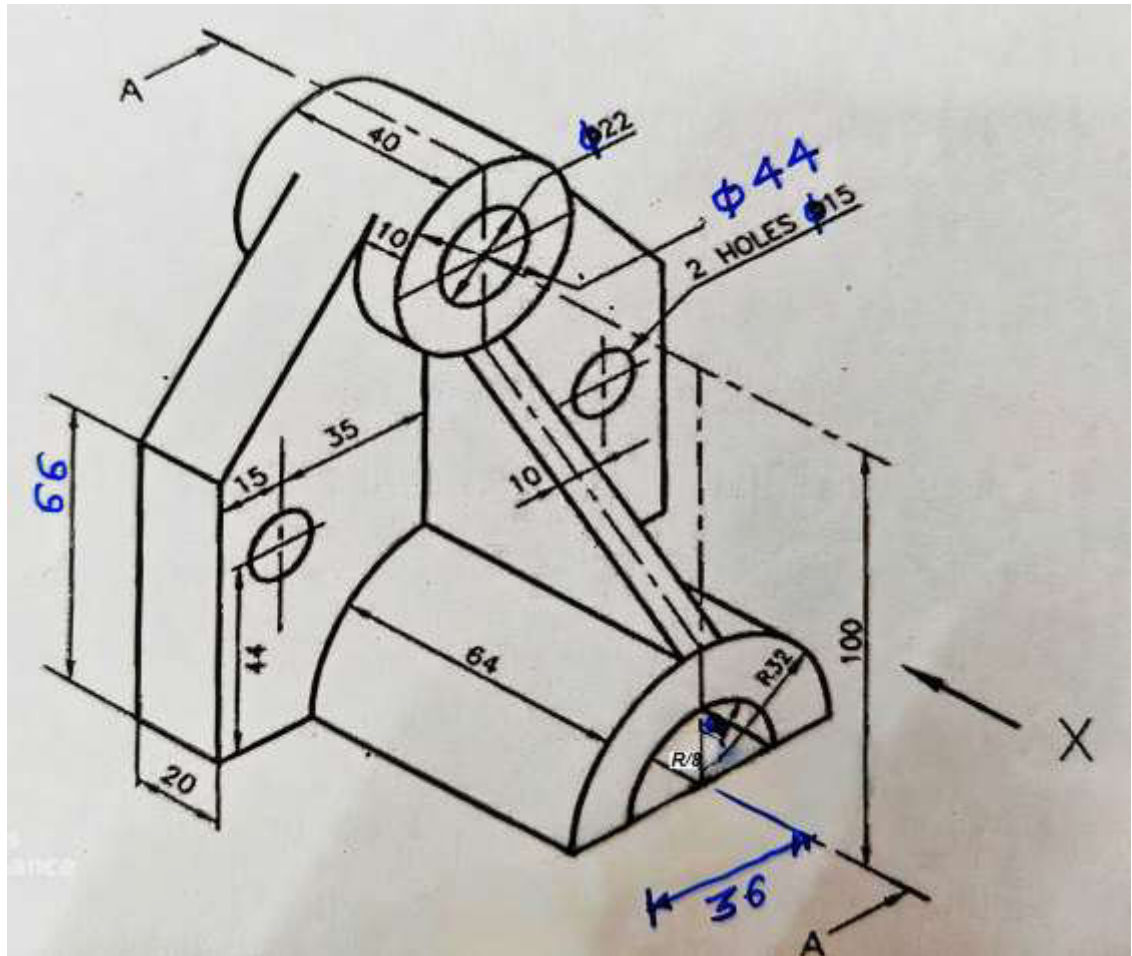
- Q.4** A hexagonal prism side of base 40 mm and axis length 70 mm is resting on one of its base edge on HP such that its axis inclined at 45° to HP and the side on which it is resting is inclined at 30° to VP. Draw projections of solid. **10**

OR

A pentagonal pyramid side of base 35 mm and axis 60 mm is resting on one of its base corner in HRP. Solid is tilted in such away that, slant edge passing through the resting corner is inclined at 40° to HRP. Complete the projections of solid when the top view of axis of pyramid makes an angle 45° to FRP.

Section – II

- Q.5** A pictorial view of an object is shown in Fig. Draw full size the following views. **18**
- Front view in the direction 'X'.
 - Sectional Left hand side view
 - Top view.



- Q.6** A square prism of base side 30 mm and height 60 mm rests on the HP on one of its corner of the base with two of its rectangular faces equally inclined to the VP. It is cut by a plane perpendicular to the VP and inclined at 60° to the HP meeting the axis, at 15 mm from the top. Draw its front view, sectional top view and the true shape of the section. **10**

OR

A square pyramid, base 40 mm side and axis 65 mm long, has its base on the HP and all the edges of the base equally inclined to the VP. It is cut by a section plane, perpendicular to the VP, inclined at 45° to the HP and bisecting the axis. Draw its sectional top view, and true shape of the section.

Set	P
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4	1
5	1
6	1
7	1
8	1
9	1
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100	1

Seat No.	
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Set P

F.Y. (B.Tech.) (Sem-II) (Old) (CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering (BTN10204)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

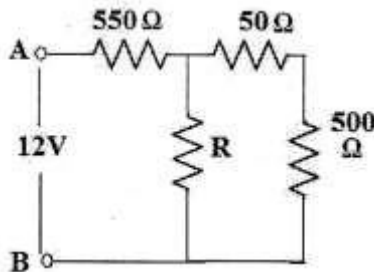
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any FOUR.

16

- a) State and Explain Kirchhoff's voltage and current laws. Give suitable illustration.
 b) What is the value of unknown resistor R in fig. if the voltage drop across 500 Ω resistor is 2.5 V? All resistors are in Ω .

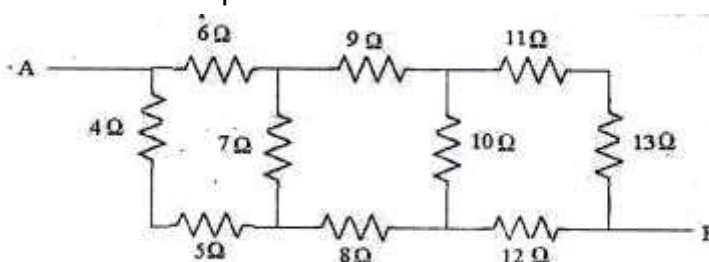


- c) Define and explain following terms:
 i) Magnetic Flux
 ii) Flux Density
 iii) Magnetic field strength
 iv) Reluctance
- d) Define RMS value. Prove that the RMS value of sinusoidal alternating current is 0.707 times the peak value.
- e) A coil having a resistance of 10 Ω and inductance of 0.2 H is connected to a 100 V, 50 Hz 1 ph A.C supply.
 Calculate:-
 i) Impedance of the coil
 ii) Reactance of coil
 iii) Current taken
 iv) Phase difference between current and applied voltage.
- f) Derive the relationship between line and phase quantities in balanced star connected 3 -phase load.

Q.3 Solve any TWO

12

- a) Calculate the equivalent resistance between A and B for the following circuit.



- b) Define single phase Derive the induced emf equation for a single phase transformer. Write emf equation in terms B_m .
- c) Explain series R-L-C ac circuit for condition $X_L > X_C$, with voltage triangle, impedance triangle, phasor diagram and power factor.

Section – II**Q.4 Solve any FOUR.****16**

- a) Explain the operation of full wave rectifier with center tap transformer. Draw input and output waveforms.
- b) Compare common base, common emitter and common collector configuration of transistor amplifier.
- c) Explain in detail Linear variable differential transformer as transducer.
- d) Explain working of Bipolar Junction Transistor as an amplifier.
- e) Explain all basic gates with the help of symbol, equation and truth table.
- f) What is transducer? What are the types of transducer? Explain with suitable example.

Q.5 Solve any TWO.**12**

- a) Explain the operation of Zener diode as a voltage regulator circuit.
- b)
 - 1) Convert $(A97.B8)_{16}$ to decimal, and octal.
 - 2) Perform the subtraction using 2's compliment $(175)_8 - (100)_8$
 - 3) Convert the decimal number to hex
 - i) $(180.125)_{10}$
 - ii) $(956)_{10}$
- c) What is meant by universal gate? Derive basic gates using NOR gate.

Seat No.	
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F.Y. (B.Tech.) (Sem-II) (Old) (CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering (BTN10204)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) An P-type semiconductor is _____.
 a) positively charged b) negatively charged
 c) electrically neutral d) None of these
- 2) To display the light 8 in a seven-segment indicator _____.
 a) C must be lighted b) G must be off
 c) F must be on d) All segments must be lighted
- 3) $I_C = \beta I_B + \underline{\hspace{1cm}}$.
 a) I_{CBO} b) I_C
 c) I_{CEO} d) αI_E
- 4) The base of transistor is _____.
 a) lightly doped b) Moderately doped
 c) Heavily doped d) None of these
- 5) Thermocouple is a _____ transducer and used for measurement of _____.
 a) passive, temperature b) active, light intensity
 c) active, displacement d) active, temperature
- 6) $(\overline{A \cdot B}) = \underline{\hspace{1cm}}$.
 a) $\overline{A} + \overline{B}$ b) $\overline{A} - \overline{B}$
 c) $\overline{A} \cdot \overline{B}$ d) None of the above
- 7) The binary no. $(10101100110.01011)_2$ is equivalent to octal no.
 a) $(2546.26)_8$ b) $(2546.62)_8$
 c) $(2645.26)_8$ d) $(2456.26)_8$
- 8) Ideal voltage source having internal resistance _____.
 a) infinity b) zero
 c) less d) more
- 9) A uniform wire of resistance R is divided into 10 equal parts and all of them are connected in parallel. The equivalent resistance will be _____.
 a) $0.01 R$ b) $0.1 R$
 c) $10 R$ d) $100 R$

Seat No.	
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Set **Q**

F.Y. (B.Tech.) (Sem-II) (Old) (CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering (BTN10204)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

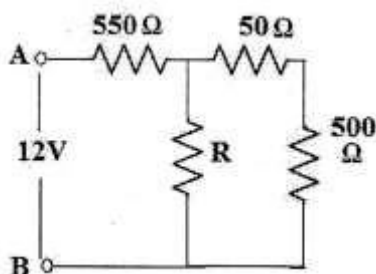
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any FOUR.

16

- a) State and Explain Kirchhoff's voltage and current laws. Give suitable illustration.
 b) What is the value of unknown resistor R in fig. if the voltage drop across 500 Ω resistor is 2.5 V? All resistors are in Ω .

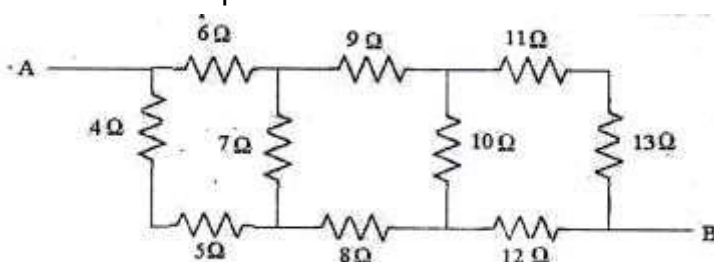


- c) Define and explain following terms:
 i) Magnetic Flux
 ii) Flux Density
 iii) Magnetic field strength
 iv) Reluctance
- d) Define RMS value. Prove that the RMS value of sinusoidal alternating current is 0.707 times the peak value.
- e) A coil having a resistance of 10 Ω and inductance of 0.2 H is connected to a 100 V, 50 Hz 1 ph A.C supply.
 Calculate:-
 i) Impedance of the coil
 ii) Reactance of coil
 iii) Current taken
 iv) Phase difference between current and applied voltage.
- f) Derive the relationship between line and phase quantities in balanced star connected 3 -phase load.

Q.3 Solve any TWO

12

- a) Calculate the equivalent resistance between A and B for the following circuit.



- b) Define single phase Derive the induced emf equation for a single phase transformer. Write emf equation in terms B_m .
- c) Explain series R-L-C ac circuit for condition $X_L > X_C$, with voltage triangle, impedance triangle, phasor diagram and power factor.

Section – II

Q.4 Solve any FOUR.

16

- a) Explain the operation of full wave rectifier with center tap transformer. Draw input and output waveforms.
- b) Compare common base, common emitter and common collector configuration of transistor amplifier.
- c) Explain in detail Linear variable differential transformer as transducer.
- d) Explain working of Bipolar Junction Transistor as an amplifier.
- e) Explain all basic gates with the help of symbol, equation and truth table.
- f) What is transducer? What are the types of transducer? Explain with suitable example.

Q.5 Solve any TWO.

12

- a) Explain the operation of Zener diode as a voltage regulator circuit.
- b)
 - 1) Convert $(A97.B8)_{16}$ to decimal, and octal.
 - 2) Perform the subtraction using 2's compliment $(175)_8 - (100)_8$
 - 3) Convert the decimal number to hex
 - i) $(180.125)_{10}$
 - ii) $(956)_{10}$
- c) What is meant by universal gate? Derive basic gates using NOR gate.

**Seat
No.**

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 - 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 - 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) The base of transistor is _____.
a) lightly doped
b) Moderately doped
c) Heavily doped
d) None of these
- 2) Thermocouple is a _____ transducer and used for measurement of _____.
a) passive, temperature
b) active, light intensity
c) active, displacement
d) active, temperature
- 3) $(\overline{A \cdot B}) =$ _____.
a) $\overline{A} + \overline{B}$
b) $\overline{A} - \overline{B}$
c) $\overline{A} \cdot \overline{B}$
d) None of the above
- 4) The binary no. $(10101100110.01011)_2$ is equivalent to octal no.
a) $(2546.26)_8$
b) $(2546.62)_8$
c) $(2645.26)_8$
d) $(2456.26)_8$
- 5) Ideal voltage source having internal resistance _____.
a) infinity
b) zero
c) less
d) more
- 6) A uniform wire of resistance R is divided into 10 equal parts and all of them are connected in parallel. The equivalent resistance will be _____.
a) 0.01 R
b) 0.1 R
c) 10 R
d) 100 R
- 7) Coefficient of coupling $K =$ _____.
a) $K = M/L_1 L_2$
b) $K = M L_1 L_2$
c) $K = M/\sqrt{L_1 L_2}$
d) None of these
- 8) The frequency of a secondary voltage of transformer is _____.
a) greater than primary
b) 50 Hz
c) 60 Hz
d) equal to that of primary
- 9) Inductive reactance is denoted by letter _____ and measured in _____.
a) X_c , Farad
b) X_L , Henry
c) X_c , ohm
d) X_L , ohm

Seat No.	
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Set **R**

F.Y. (B.Tech.) (Sem-II) (Old) (CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering (BTN10204)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

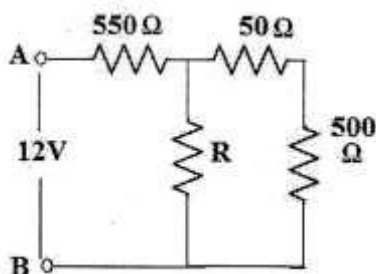
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any FOUR.

16

- a) State and Explain Kirchhoff's voltage and current laws. Give suitable illustration.
 b) What is the value of unknown resistor R in fig. if the voltage drop across 500 Ω resistor is 2.5 V? All resistors are in Ω .

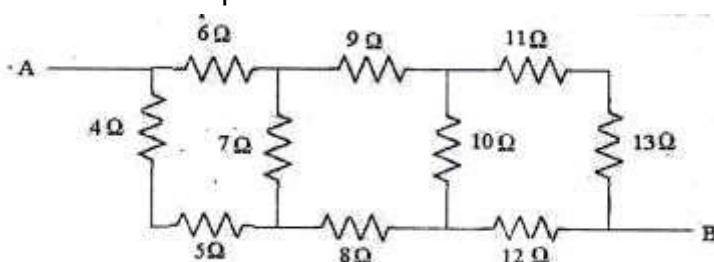


- c) Define and explain following terms:
 i) Magnetic Flux
 ii) Flux Density
 iii) Magnetic field strength
 iv) Reluctance
- d) Define RMS value. Prove that the RMS value of sinusoidal alternating current is 0.707 times the peak value.
- e) A coil having a resistance of 10 Ω and inductance of 0.2 H is connected to a 100 V, 50 Hz 1 ph A.C supply.
 Calculate:-
 i) Impedance of the coil
 ii) Reactance of coil
 iii) Current taken
 iv) Phase difference between current and applied voltage.
- f) Derive the relationship between line and phase quantities in balanced star connected 3 -phase load.

Q.3 Solve any TWO

12

- a) Calculate the equivalent resistance between A and B for the following circuit.



- b) Define single phase Derive the induced emf equation for a single phase transformer. Write emf equation in terms B_m .
- c) Explain series R-L-C ac circuit for condition $X_L > X_C$, with voltage triangle, impedance triangle, phasor diagram and power factor.

Section – II

Q.4 Solve any FOUR.

16

- a) Explain the operation of full wave rectifier with center tap transformer. Draw input and output waveforms.
- b) Compare common base, common emitter and common collector configuration of transistor amplifier.
- c) Explain in detail Linear variable differential transformer as transducer.
- d) Explain working of Bipolar Junction Transistor as an amplifier.
- e) Explain all basic gates with the help of symbol, equation and truth table.
- f) What is transducer? What are the types of transducer? Explain with suitable example.

Q.5 Solve any TWO.

12

- a) Explain the operation of Zener diode as a voltage regulator circuit.
- b)
 - 1) Convert $(A97.B8)_{16}$ to decimal, and octal.
 - 2) Perform the subtraction using 2's compliment $(175)_8 - (100)_8$
 - 3) Convert the decimal number to hex
 - i) $(180.125)_{10}$
 - ii) $(956)_{10}$
- c) What is meant by universal gate? Derive basic gates using NOR gate.

F.Y. (B.Tech.) (Sem-II) (Old) (CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering (BTN10204)

Max. Marks: 70

MCQ/Objective Type Questions

Marks: 14

14

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F.Y. (B.Tech.) (Sem-II) (Old) (CBCS) Examination: March/April-2024
Basic Electrical & Electronics Engineering (BTN10204)

Day & Date: Friday, 31-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

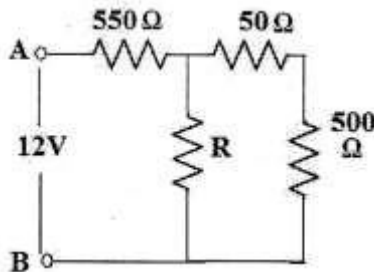
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any FOUR.

16

- a) State and Explain Kirchhoff's voltage and current laws. Give suitable illustration.
 b) What is the value of unknown resistor R in fig. if the voltage drop across 500 Ω resistor is 2.5 V? All resistors are in Ω .

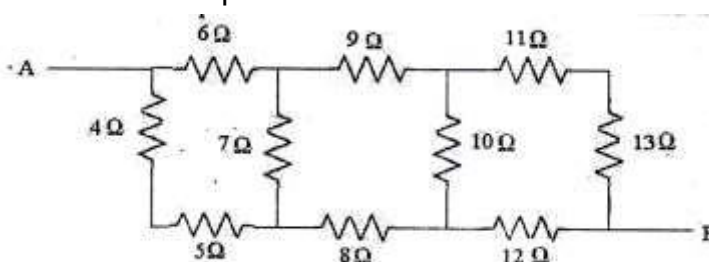


- c) Define and explain following terms:
 i) Magnetic Flux
 ii) Flux Density
 iii) Magnetic field strength
 iv) Reluctance
- d) Define RMS value. Prove that the RMS value of sinusoidal alternating current is 0.707 times the peak value.
- e) A coil having a resistance of 10 Ω and inductance of 0.2 H is connected to a 100 V, 50 Hz 1 ph A.C supply.
 Calculate:-
 i) Impedance of the coil
 ii) Reactance of coil
 iii) Current taken
 iv) Phase difference between current and applied voltage.
- f) Derive the relationship between line and phase quantities in balanced star connected 3 -phase load.

Q.3 Solve any TWO

12

- a) Calculate the equivalent resistance between A and B for the following circuit.



- b) Define single phase Derive the induced emf equation for a single phase transformer. Write emf equation in terms B_m .
- c) Explain series R-L-C ac circuit for condition $X_L > X_C$, with voltage triangle, impedance triangle, phasor diagram and power factor.

Section – II

Q.4 Solve any FOUR.

16

- a) Explain the operation of full wave rectifier with center tap transformer. Draw input and output waveforms.
- b) Compare common base, common emitter and common collector configuration of transistor amplifier.
- c) Explain in detail Linear variable differential transformer as transducer.
- d) Explain working of Bipolar Junction Transistor as an amplifier.
- e) Explain all basic gates with the help of symbol, equation and truth table.
- f) What is transducer? What are the types of transducer? Explain with suitable example.

Q.5 Solve any TWO.

12

- a) Explain the operation of Zener diode as a voltage regulator circuit.
- b)
 - 1) Convert $(A97.B8)_{16}$ to decimal, and octal.
 - 2) Perform the subtraction using 2's compliment $(175)_8 - (100)_8$
 - 3) Convert the decimal number to hex
 - i) $(180.125)_{10}$
 - ii) $(956)_{10}$
- c) What is meant by universal gate? Derive basic gates using NOR gate.

Seat No.	
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CIVIL ENGINEERING

Max. Marks: 70

3) Figures to the right indicates full marks.

Marks: 14

- 1) A series of closed contours on a map indicates _____.
a) a close traverse b) a depression
c) a summit d) either (b) or (c)
- 2) The direction of steepest slope on a contour is _____.
a) along the contour b) at right angles to the contour
c) at 45° to the contour d) at 30° to the contour
- 3) When consecutive contour lines run close together, it indicates a _____.
a) Steep slope b) Flatter slope
c) Vertical surface d) none of the above
- 4) A theodolite in which the telescope can be revolved through a complete revolution in a vertical plane is known as _____.
a) non transit theodolite b) Tilting theodolite
c) Transit theodolite d) None of the above
- 5) If N be the number of sides of the traverse, then the sum of measured exterior angles should be equal to _____.
a) $(2n - 4) \times 90^\circ$ b) $(2n + 4) \times 90^\circ$
c) $(n + 4) \times 90^\circ$ d) $(n - 4) \times 90^\circ$
- 6) The characteristic of Gale's table is that the independent coordinates of all points are brought to the _____.
a) fourth quadrant b) first quadrant
c) Third quadrant d) Second quadrant
- 7) The distance in EDM is measured by _____.
a) Frequency of the wave b) Wave length
c) Phase difference d) Amplitude
- 8) Which of the following indicates the correct set of the combination of total station?
a) Theodolite, compass b) Theodolite, EDM
c) Electronic theodolite, EDM d) EDM, GPS

- 9) The number of orbital planes and satellites in each orbit are, respectively.
a) 6, 4
b) 4, 6
c) 4, 3
d) 3, 4
- 10) What is the minimum number of satellites required from which signals can be recovered to enable a global positioning system receiver to determine latitude, longitude and altitude?
a) One
b) Two
c) Three
d) four
- 11) Remote sensing can be defined as collecting information about a target _____.
a) without seeing it
b) by touching it
c) without a physical contact with it
d) from a ground station
- 12) A passive sensor uses which of the following sources of energy?
a) Sun
b) Flash light
c) Its own source
d) Moon
- 13) Aerial photographs are _____.
a) perspective projections
b) orthographic projections
c) isometric projections
d) gnomonic projections
- 14) Cell-like units are characteristic of _____.
a) raster data structures
b) cellular data structures
c) both (a) and (b)
d) vector data structures

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

CIVIL ENGINEERING

Surveying & Geomatics (BTN01301)

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

Instructions: 1) Q.2 & Q.6 are Compulsory.

2) Solve any two questions out of Q.no. 3, 4 and 5 in section - I.

3) Solve any two questions out of Q.no. 7, 8 and 9 in Section - II.

4) Figures to the right indicate full marks.

Section – I

Q.2 Write a detailed note on. 12

- a) Construction and use of Automatic level.
- b) Explain Indirect method of contouring.
- c) Write down characteristics of contouring.

Q.3 Explain 08

- a) Construction of vernier theodolite with parts.
- b) Use of theodolite for measurement of deflection angle.

Q.4 Explain 08

- a) Construction of Laser level.
- b) Construction of Total Station.

Q.5 Solve 08

- a) Write down uses of total station in detail.
- b) What are the different uses of theodolite instrument.

Section – II

Q.6 Write a detailed note on. 12

- a) What are the segments of GPS? Describe them briefly.
- b) Explain Absolute Positioning, Relative Positioning and Differential positioning as methods of observation in GPS.
- c) Write a short note on GPS receivers and their comparison

Q.7 Explain 08

- a) Write a short note on Unmanned Aerial Vehicle (Drone) used in Remote sensing.
- b) A vertical photograph was taken at an altitude of 1200 meters above mean sea level. Determine the scale of the photograph for terrain lying at elevations of 80 meters and 300 meters if the focal length of the camera is 15 cm.

Q.8 Solve the following.

- a) Write down applications of Remote Sensing Technique.
- b) Project Survey for Building Lineout.

Q.9 Solve the following.

- a) Write down applications of GIS.
- b) Compare the Raster images with Vector images.

Seat No.	
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Set Q

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Surveying & Geomatics (BTN01301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No 3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.

Multiple Choice Questions / Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

- 1) Which of the following indicates the correct set of the combination of total station?

a) Theodolite, compass	b) Theodolite, EDM
c) Electronic theodolite, EDM	d) EDM, GPS
- 2) The number of orbital planes and satellites in each orbit are, respectively.

a) 6, 4	b) 4, 6
c) 4, 3	d) 3, 4
- 3) What is the minimum number of satellites required from which signals can be recovered to enable a global positioning system receiver to determine latitude, longitude and altitude?

a) One	b) Two
c) Three	d) four
- 4) Remote sensing can be defined as collecting information about a target _____.

a) without seeing it
b) by touching it
c) without a physical contact with it
d) from a ground station
- 5) A passive sensor uses which of the following sources of energy?

a) Sun	b) Flash light
c) Its own source	d) Moon
- 6) Aerial photographs are _____.

a) perspective projections	b) orthographic projections
c) isometric projections	d) gnomonic projections
- 7) Cell-like units are characteristic of _____.

a) raster data structures	b) cellular data structures
c) both (a) and (b)	d) vector data structures
- 8) A series of closed contours on a map indicates _____.

a) a close traverse	b) a depression
c) a summit	d) either (b) or (c)

Seat No.	
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Set Q**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024****CIVIL ENGINEERING****Surveying & Geomatics (BTN01301)**

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

Instructions: 1) Q.2 & Q.6 are Compulsory.

2) Solve any two questions out of Q.no. 3, 4 and 5 in section - I.

3) Solve any two questions out of Q.no. 7, 8 and 9 in Section - II.

4) Figures to the right indicate full marks.

Section – I

- Q.2 Write a detailed note on.** **12**
- a) Construction and use of Automatic level.
 - b) Explain Indirect method of contouring.
 - c) Write down characteristics of contouring.
- Q.3 Explain** **08**
- a) Construction of vernier theodolite with parts.
 - b) Use of theodolite for measurement of deflection angle.
- Q.4 Explain** **08**
- a) Construction of Laser level.
 - b) Construction of Total Station.
- Q.5 Solve** **08**
- a) Write down uses of total station in detail.
 - b) What are the different uses of theodolite instrument.

Section – II

- Q.6 Write a detailed note on.** **12**
- a) What are the segments of GPS? Describe them briefly.
 - b) Explain Absolute Positioning, Relative Positioning and Differential positioning as methods of observation in GPS.
 - c) Write a short note on GPS receivers and their comparison
- Q.7 Explain** **08**
- a) Write a short note on Unmanned Aerial Vehicle (Drone) used in Remote sensing.
 - b) A vertical photograph was taken at an altitude of 1200 meters above mean sea level. Determine the scale of the photograph for terrain lying at elevations of 80 meters and 300 meters if the focal length of the camera is 15 cm.

Q.8 Solve the following.

- a) Write down applications of Remote Sensing Technique.
- b) Project Survey for Building Lineout.

Q.9 Solve the following.

- a) Write down applications of GIS.
- b) Compare the Raster images with Vector images.

Seat No.	
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Set R

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Surveying & Geomatics (BTN01301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No 3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.

Multiple Choice Questions / Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

- 1) Remote sensing can be defined as collecting information about a target _____.
 a) without seeing it
 b) by touching it
 c) without a physical contact with it
 d) from a ground station
- 2) A passive sensor uses which of the following sources of energy?
 a) Sun
 b) Flash light
 c) Its own source
 d) Moon
- 3) Aerial photographs are _____.
 a) perspective projections
 b) orthographic projections
 c) isometric projections
 d) gnomonic projections
- 4) Cell-like units are characteristic of _____.
 a) raster data structures
 b) cellular data structures
 c) both (a) and (b)
 d) vector data structures
- 5) A series of closed contours on a map indicates _____.
 a) a close traverse
 b) a depression
 c) a summit
 d) either (b) or (c)
- 6) The direction of steepest slope on a contour is _____.
 a) along the contour
 b) at right angles to the contour
 c) at 45° to the contour
 d) at 30° to the contour
- 7) When consecutive contour lines run close together, it indicates a _____.
 a) Steep slope
 b) Flatter slope
 c) Vertical surface
 d) none of the above
- 8) A theodolite in which the telescope can be revolved through a complete revolution in a vertical plane is known as _____.
 a) non transit theodolite
 b) Tilting theodolite
 c) Transit theodolite
 d) None of the above

Seat No.	
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Set R**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024****CIVIL ENGINEERING****Surveying & Geomatics (BTN01301)**

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

Instructions: 1) Q.2 & Q.6 are Compulsory.

2) Solve any two questions out of Q.no. 3, 4 and 5 in section - I.

3) Solve any two questions out of Q.no. 7, 8 and 9 in Section - II.

4) Figures to the right indicate full marks.

Section – I

- Q.2 Write a detailed note on.** **12**
- a) Construction and use of Automatic level.
 - b) Explain Indirect method of contouring.
 - c) Write down characteristics of contouring.
- Q.3 Explain** **08**
- a) Construction of vernier theodolite with parts.
 - b) Use of theodolite for measurement of deflection angle.
- Q.4 Explain** **08**
- a) Construction of Laser level.
 - b) Construction of Total Station.
- Q.5 Solve** **08**
- a) Write down uses of total station in detail.
 - b) What are the different uses of theodolite instrument.

Section – II

- Q.6 Write a detailed note on.** **12**
- a) What are the segments of GPS? Describe them briefly.
 - b) Explain Absolute Positioning, Relative Positioning and Differential positioning as methods of observation in GPS.
 - c) Write a short note on GPS receivers and their comparison
- Q.7 Explain** **08**
- a) Write a short note on Unmanned Aerial Vehicle (Drone) used in Remote sensing.
 - b) A vertical photograph was taken at an altitude of 1200 meters above mean sea level. Determine the scale of the photograph for terrain lying at elevations of 80 meters and 300 meters if the focal length of the camera is 15 cm.

Q.8 Solve the following.

- a) Write down applications of Remote Sensing Technique.
- b) Project Survey for Building Lineout.

Q.9 Solve the following.

- a) Write down applications of GIS.
- b) Compare the Raster images with Vector images.

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

CIVIL ENGINEERING**Surveying & Geomatics (BTN01301)**

Day & Date: Monday, 13-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No 3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.

Multiple Choice Questions / Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

- 1) The characteristic of Gale's table is that the independent coordinates of all points are brought to the _____.
 - a) fourth quadrant
 - b) first quadrant
 - c) Third quadrant
 - d) Second quadrant
- 2) The distance in EDM is measured by _____.
 - a) Frequency of the wave
 - b) Wave length
 - c) Phase difference
 - d) Amplitude
- 3) Which of the following indicates the correct set of the combination of total station?
 - a) Theodolite, compass
 - b) Theodolite, EDM
 - c) Electronic theodolite, EDM
 - d) EDM, GPS
- 4) The number of orbital planes and satellites in each orbit are, respectively.
 - a) 6, 4
 - b) 4, 6
 - c) 4, 3
 - d) 3, 4
- 5) What is the minimum number of satellites required from which signals can be recovered to enable a global positioning system receiver to determine latitude, longitude and altitude?
 - a) One
 - b) Two
 - c) Three
 - d) four
- 6) Remote sensing can be defined as collecting information about a target _____.
 - a) without seeing it
 - b) by touching it
 - c) without a physical contact with it
 - d) from a ground station
- 7) A passive sensor uses which of the following sources of energy?
 - a) Sun
 - b) Flash light
 - c) Its own source
 - d) Moon

- 8) Aerial photographs are _____.
a) perspective projections b) orthographic projections
c) isometric projections d) gnomonic projections
- 9) Cell-like units are characteristic of _____.
a) raster data structures b) cellular data structures
c) both (a) and (b) d) vector data structures
- 10) A series of closed contours on a map indicates _____.
a) a close traverse b) a depression
c) a summit d) either (b) or (c)
- 11) The direction of steepest slope on a contour is _____.
a) along the contour b) at right angles to the contour
c) at 45° to the contour d) at 30° to the contour
- 12) When consecutive contour lines run close together, it indicates a _____.
a) Steep slope b) Flatter slope
c) Vertical surface d) none of the above
- 13) A theodolite in which the telescope can be revolved through a complete revolution in a vertical plane is known as _____.
a) non transit theodolite b) Tilting theodolite
c) Transit theodolite d) None of the above
- 14) If N be the number of sides of the traverse, then the sum of measured exterior angles should be equal to _____.
a) $(2n - 4) \times 90^\circ$ b) $(2n + 4) \times 90^\circ$
c) $(n + 4) \times 90^\circ$ d) $(n - 4) \times 90^\circ$

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**CIVIL ENGINEERING****Surveying & Geomatics (BTN01301)**

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

Instructions: 1) Q.2 & Q.6 are Compulsory.

2) Solve any two questions out of Q.no. 3, 4 and 5 in section - I.

3) Solve any two questions out of Q.no. 7, 8 and 9 in Section - II.

4) Figures to the right indicate full marks.

Section – I

- Q.2 Write a detailed note on.** **12**
a) Construction and use of Automatic level.
b) Explain Indirect method of contouring.
c) Write down characteristics of contouring.
- Q.3 Explain** **08**
a) Construction of vernier theodolite with parts.
b) Use of theodolite for measurement of deflection angle.
- Q.4 Explain** **08**
a) Construction of Laser level.
b) Construction of Total Station.
- Q.5 Solve** **08**
a) Write down uses of total station in detail.
b) What are the different uses of theodolite instrument.

Section – II

- Q.6 Write a detailed note on.** **12**
a) What are the segments of GPS? Describe them briefly.
b) Explain Absolute Positioning, Relative Positioning and Differential positioning as methods of observation in GPS.
c) Write a short note on GPS receivers and their comparison
- Q.7 Explain** **08**
a) Write a short note on Unmanned Aerial Vehicle (Drone) used in Remote sensing.
b) A vertical photograph was taken at an altitude of 1200 meters above mean sea level. Determine the scale of the photograph for terrain lying at elevations of 80 meters and 300 meters if the focal length of the camera is 15 cm.

Q.8 Solve the following.

- a) Write down applications of Remote Sensing Technique.
- b) Project Survey for Building Lineout.

Q.9 Solve the following.

- a) Write down applications of GIS.
- b) Compare the Raster images with Vector images.

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Fluid Mechanics and Fluid Machines (BTN01302)

Day & Date: Tuesday 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, all questions are compulsory.
 2) In Section – II, Q. 5 is compulsory and attempt two questions from the remaining questions.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary and state it clearly.
 4) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) State and prove Pascal's law. **04**
 b) The space between two flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of oil film is 12.5 mm. The upper plate which moves at 2.5m/s requires a force of 98.1 N to maintain the speed. **04**
 Determine:
 i) The Dynamic Viscosity of oil
 ii) Kinematic Viscosity of oil if Sp.gr of oil is 0.95
- Q.3 Attempt any Two.** **10**
 a) Define the terms:
 i) Velocity Potential
 ii) Stream Function
 iii) Streak Line
 iv) Stream Line
 b) The right limb of a simple U-tube manometer containing mercury is open to atmosphere while left limb is connected to a pipe in which a fluid of sp. gr. 0.9 is flowing. The centre of pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if difference of mercury level in the two limbs is 20 cm.
 c) A circular plate of 1.5 m diameter is immersed in water in such a way that its greatest and least depth below the free surface are 2 m and 0.75 m resp. Determine; (i) Total pressure on the plate, (ii) Centre of plate
- Q.4 Solve any two of the following** **10**
 a) Derive Bernoulli's theorem for steady flow of an incompressible fluid and state assumptions made for the derivation.
 b) If for a two dimensional potential flow, the velocity potential is given by $\phi = 3xy$. Determine the velocity at the point P(2,6). Determine also the value of stream function Ψ at the point P.
 c) Find the discharge of water flowing over a rectangular notch of 2.5m length when the constant head over the notch is 400mm. Take $C_d = 0.62$.

Section – II

- Q.5** a) Show that average velocity is half of maximum velocity in laminar flow through pipe. **05**
b) Show that frictional torque τ of a disc of diameter D at a speed N is in fluid of viscosity μ and density ρ in a turbulent flow is given by **05**
$$\tau = D^5 N^2 \rho \Phi[\mu/D^2 N \rho]$$
- Q.6** a) What is mean by turbine? Give detailed classification of turbines. **05**
b) What is mean by dimensional analysis? what are its uses? **04**
- Q.7** a) Derive an expression for force exerted by a jet on stationary curved plate, when jet strikes at centre of symmetrical curved plate. **05**
b) A centrifugal pump is to discharge $0.3 \text{ m}^3/\text{s}$. at a speed of 1500 rpm against a head of 22 m. the impeller diameter is 250 mm and the width at outlet is 50 mm and manometric efficiency is 80%. Determine vane angle at outer periphery of the impeller. **04**
- Q.8** a) Find the displacement thickness, momentum thickness, energy thickness and shape factor for the velocity distribution in the boundary layer given by $u/U = y/\delta$ **05**
b) What are the different efficiencies of centrifugal pump? Explain them. **04**

Seat No.	
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Set Q

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Fluid Mechanics and Fluid Machines (BTN01302)

Day & Date: Tuesday 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.

3) Figures to the right indicates full marks.

4) Assume suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) The shear stress distribution in laminar flow through a pipe follows _____ law.
 - a) Parabolic
 - b) Logarithmic
 - c) Linear
 - d) Exponential
- 2) The velocity distribution in laminar flow through a pipe follows _____ law.
 - a) Parabolic
 - b) Logarithmic
 - c) Linear
 - d) Exponential
- 3) Following is not a minor head loss _____
 - a) loss at exit of pipe
 - b) loss at enhance of pipe
 - c) friction loss
 - d) none of these
- 4) Given that, N = speed, P = power, H = head, the specific speed of a hydraulic turbine is given by
 - a) $\frac{N\sqrt{P}}{H^{4/5}}$
 - b) $\frac{N\sqrt{P}}{H^{5/4}}$
 - c) $\frac{P\sqrt{N}}{H^{4/5}}$
 - d) $\frac{P\sqrt{N}}{H^{5/4}}$
- 5) An impulse turbine requires _____
 - a) high head and small quantity of flow
 - b) low head and small quantity of flow
 - c) low head and high rate of flow
 - d) none of the above.
- 6) What will happen if requirements of net positive suction head (NPSH) for a given pump are not satisfied?
 - a) The pump will get cavitated
 - b) The pump will consume more power
 - c) The pump will not develop head
 - d) The pump will have a low efficiency
- 7) In a centrifugal pump the regulating valve is provided on _____
 - a) the suction pipe
 - b) delivery pipe
 - c) the casing
 - d) none of the above

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Q

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Fluid Mechanics and Fluid Machines (BTN01302)

Day & Date: Tuesday 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, all questions are compulsory.
 2) In Section – II, Q. 5 is compulsory and attempt two questions from the remaining questions.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary and state it clearly.
 4) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) State and prove Pascal's law. **04**
 b) The space between two flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of oil film is 12.5 mm. The upper plate which moves at 2.5m/s requires a force of 98.1 N to maintain the speed. **04**
 Determine:
 i) The Dynamic Viscosity of oil
 ii) Kinematic Viscosity of oil if Sp. gr of oil is 0.95
- Q.3 Attempt any Two.** **10**
 a) Define the terms:
 i) Velocity Potential
 ii) Stream Function
 iii) Streak Line
 iv) Stream Line
 b) The right limb of a simple U-tube manometer containing mercury is open to atmosphere while left limb is connected to a pipe in which a fluid of sp. gr. 0.9 is flowing. The centre of pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if difference of mercury level in the two limbs is 20 cm.
 c) A circular plate of 1.5 m diameter is immersed in water in such a way that its greatest and least depth below the free surface are 2 m and 0.75 m resp. Determine; (i) Total pressure on the plate, (ii) Centre of plate
- Q.4 Solve any two of the following** **10**
 a) Derive Bernoulli's theorem for steady flow of an incompressible fluid and state assumptions made for the derivation.
 b) If for a two dimensional potential flow, the velocity potential is given by $\phi = 3xy$. Determine the velocity at the point P(2,6). Determine also the value of stream function Ψ at the point P.
 c) Find the discharge of water flowing over a rectangular notch of 2.5m length when the constant head over the notch is 400mm. Take $C_d = 0.62$.

Section – II

- Q.5** a) Show that average velocity is half of maximum velocity in laminar flow through pipe. **05**
b) Show that frictional torque τ of a disc of diameter D at a speed N is in fluid of viscosity μ and density ρ in a turbulent flow is given by **05**
$$\tau = D^5 N^2 \rho \Phi[\mu/D^2 N \rho]$$
- Q.6** a) What is mean by turbine? Give detailed classification of turbines. **05**
b) What is mean by dimensional analysis? what are its uses? **04**
- Q.7** a) Derive an expression for force exerted by a jet on stationary curved plate, when jet strikes at centre of symmetrical curved plate. **05**
b) A centrifugal pump is to discharge $0.3 \text{ m}^3/\text{s}$. at a speed of 1500 rpm against a head of 22 m. the impeller diameter is 250 mm and the width at outlet is 50 mm and manometric efficiency is 80%. Determine vane angle at outer periphery of the impeller. **04**
- Q.8** a) Find the displacement thickness, momentum thickness, energy thickness and shape factor for the velocity distribution in the boundary layer given by $u/U = y/\delta$ **05**
b) What are the different efficiencies of centrifugal pump? Explain them. **04**

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Set **R**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Fluid Mechanics and Fluid Machines (BTN01302)

Day & Date: Tuesday 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary and state it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) Given that, N = speed, P = power, H = head, the specific speed of a hydraulic turbine is given by

a) $\frac{N\sqrt{P}}{H^{4/5}}$	b) $\frac{N\sqrt{P}}{H^{5/4}}$
c) $\frac{P\sqrt{N}}{H^{4/5}}$	d) $\frac{P\sqrt{N}}{H^{5/4}}$
- 2) An impulse turbine requires _____
 - a) high head and small quantity of flow
 - b) low head and small quantity of flow
 - c) low head and high rate of flow
 - d) none of the above.
- 3) What will happen if requirements of net positive suction head (NPSH) for a given pump are not satisfied?
 - a) The pump will get cavitated
 - b) The pump will consume more power
 - c) The pump will not develop head
 - d) The pump will have a low efficiency
- 4) In a centrifugal pump the regulating valve is provided on _____

a) the suction pipe	b) delivery pipe
c) the casing	d) none of the above
- 5) The motion is described as _____ when the rotational components are zero throughout certain point of fluid.

a) rotational	b) irrotational
c) either of the above	d) none of the above
- 6) Newton's law of viscosity is given by the relation _____

a) $\tau = \mu^2 \frac{du}{dy}$	b) $\tau = \sqrt{\mu} \frac{du}{dy}$
c) $\tau = \mu \frac{du}{dy}$	d) $\tau = \mu^{3/2} \frac{du}{dy}$

- 7) Inclined single column manometer is useful for the measurement of _____ pressures.
- | | |
|-------------|-----------|
| a) negative | b) medium |
| c) high | d) small |
- 8) The path followed by the fluid particle in motion is called as _____
- | | |
|----------------|----------------------|
| a) streak line | b) stream line |
| c) path line | d) none of the above |
- 9) The point of application of the total pressure on the surface is _____
- | | |
|----------------------------|-----------------------|
| a) centroid of the surface | b) centre of pressure |
| c) either of the above | d) none of the above |
- 10) An ice cube is floating in glass of water. As the cube melts the water level _____
- | | |
|--------------------|----------------------|
| a) remain constant | b) falls |
| c) rises | d) none of the above |
- 11) If the liquid is having specific weight of 7000 N/m^3 then its specific gravity is _____
- | | |
|----------|------------------|
| a) 0.832 | b) 0.981 |
| c) 0.713 | d) None of above |
- 12) The shear stress distribution in laminar flow through a pipe follows _____ law.
- | | |
|--------------|----------------|
| a) Parabolic | b) Logarithmic |
| c) Linear | d) Exponential |
- 13) The velocity distribution in laminar flow through a pipe follows _____ law.
- | | |
|--------------|----------------|
| a) Parabolic | b) Logarithmic |
| c) Linear | d) Exponential |
- 14) Following is not a minor head loss _____
- | | |
|-------------------------|----------------------------|
| a) loss at exit of pipe | b) loss at enhance of pipe |
| c) friction loss | d) none of these |

Seat No.	
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Set

R

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Fluid Mechanics and Fluid Machines (BTN01302)

Day & Date: Tuesday 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, all questions are compulsory.
 2) In Section – II, Q. 5 is compulsory and attempt two questions from the remaining questions.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary and state it clearly.
 4) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) State and prove Pascal's law. **04**
 b) The space between two flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of oil film is 12.5 mm. The upper plate which moves at 2.5m/s requires a force of 98.1 N to maintain the speed. **04**
 Determine:
 i) The Dynamic Viscosity of oil
 ii) Kinematic Viscosity of oil if Sp.gr of oil is 0.95
- Q.3 Attempt any Two.** **10**
 a) Define the terms:
 i) Velocity Potential
 ii) Stream Function
 iii) Streak Line
 iv) Stream Line
 b) The right limb of a simple U-tube manometer containing mercury is open to atmosphere while left limb is connected to a pipe in which a fluid of sp. gr. 0.9 is flowing. The centre of pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if difference of mercury level in the two limbs is 20 cm.
 c) A circular plate of 1.5 m diameter is immersed in water in such a way that its greatest and least depth below the free surface are 2 m and 0.75 m resp. Determine; (i) Total pressure on the plate, (ii) Centre of plate
- Q.4 Solve any two of the following** **10**
 a) Derive Bernoulli's theorem for steady flow of an incompressible fluid and state assumptions made for the derivation.
 b) If for a two dimensional potential flow, the velocity potential is given by $\phi = 3xy$. Determine the velocity at the point P(2,6). Determine also the value of stream function Ψ at the point P.
 c) Find the discharge of water flowing over a rectangular notch of 2.5m length when the constant head over the notch is 400mm. Take $C_d = 0.62$.

Section – II

- Q.5** a) Show that average velocity is half of maximum velocity in laminar flow through pipe. **05**
b) Show that frictional torque τ of a disc of diameter D at a speed N is in fluid of viscosity μ and density ρ in a turbulent flow is given by **05**
$$\tau = D^5 N^2 \rho \Phi[\mu/D^2 N \rho]$$
- Q.6** a) What is mean by turbine? Give detailed classification of turbines. **05**
b) What is mean by dimensional analysis? what are its uses? **04**
- Q.7** a) Derive an expression for force exerted by a jet on stationary curved plate, when jet strikes at centre of symmetrical curved plate. **05**
b) A centrifugal pump is to discharge $0.3 \text{ m}^3/\text{s}$. at a speed of 1500 rpm against a head of 22 m. the impeller diameter is 250 mm and the width at outlet is 50 mm and manometric efficiency is 80%. Determine vane angle at outer periphery of the impeller. **04**
- Q.8** a) Find the displacement thickness, momentum thickness, energy thickness and shape factor for the velocity distribution in the boundary layer given by $u/U = y/\delta$ **05**
b) What are the different efficiencies of centrifugal pump? Explain them. **04**

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Fluid Mechanics and Fluid Machines (BTN01302)

Day & Date: Tuesday 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

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- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) An ice cube is floating in glass of water. As the cube melts the water level _____

a) remain constant b) falls
c) rises d) none of the above
- 2) If the liquid is having specific weight of 7000 N/m^3 then its specific gravity is _____

a) 0.832 b) 0.981
c) 0.713 d) None of above
- 3) The shear stress distribution in laminar flow through a pipe follows _____ law.

a) Parabolic b) Logarithmic
c) Linear d) Exponential
- 4) The velocity distribution in laminar flow through a pipe follows _____ law.

a) Parabolic b) Logarithmic
c) Linear d) Exponential
- 5) Following is not a minor head loss _____

a) loss at exit of pipe b) loss at enhance of pipe
c) friction loss d) none of these
- 6) Given that, N = speed, P = power, H = head, the specific speed of a hydraulic turbine is given by

a) $\frac{N\sqrt{P}}{H^{4/5}}$ b) $\frac{N\sqrt{P}}{H^{5/4}}$
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- 9) In a centrifugal pump the regulating valve is provided on _____
- the suction pipe
 - the casing
 - delivery pipe
 - none of the above
- 10) The motion is described as _____ when the rotational components are zero throughout certain point of fluid.
- rotational
 - irrotational
 - either of the above
 - none of the above
- 11) Newton's law of viscosity is given by the relation _____
- $\tau = \mu^2 \frac{du}{dy}$
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 - $\tau = \mu \frac{du}{dy}$
 - $\tau = \mu^{3/2} \frac{du}{dy}$
- 12) Inclined single column manometer is useful for the measurement of _____ pressures.
- negative
 - medium
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 - small
- 13) The path followed by the fluid particle in motion is called as _____
- streak line
 - stream line
 - path line
 - none of the above
- 14) The point of application of the total pressure on the surface is _____
- centroid of the surface
 - centre of pressure
 - either of the above
 - none of the above

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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Fluid Mechanics and Fluid Machines (BTN01302)

Day & Date: Tuesday 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, all questions are compulsory.
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Section – I

- Q.2** a) State and prove Pascal's law. **04**
 b) The space between two flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of oil film is 12.5 mm. The upper plate which moves at 2.5m/s requires a force of 98.1 N to maintain the speed. **04**
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 b) The right limb of a simple U-tube manometer containing mercury is open to atmosphere while left limb is connected to a pipe in which a fluid of sp. gr. 0.9 is flowing. The centre of pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if difference of mercury level in the two limbs is 20 cm.
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- Q.5** a) Show that average velocity is half of maximum velocity in laminar flow through pipe. **05**
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- Q.8** a) Find the displacement thickness, momentum thickness, energy thickness and shape factor for the velocity distribution in the boundary layer given by $u/U = y/\delta$ **05**
 b) What are the different efficiencies of centrifugal pump? Explain them. **04**

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CIVIL ENGINEERING

Day & Date: Wednesday 15-05-2024
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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Marks: 14

14

- 1) The process of proper and accurate measurement of concrete ingredients for uniformity proportion, is known as _____.
a) Curing
b) Mixing
c) Grading
d) Batching
- 2) Admixtures which cause early setting, and hardening of concrete are called as _____.
a) Plasticizers
b) Retarders
c) Super-plasticizers
d) Accelerators
- 3) Strength of concrete increase with _____.
a) Increase in w/c ratio
b) Decrease in w/c ratio
c) Decrease in size of aggregates
d) Decrease in curing time
- 4) The choice of mix proportion of a concrete is independent of _____.
a) Grade designation
b) Maximum size of aggregate
c) Minimum water-cement ratio
d) Batching, mixing, placing and compaction techniques
- 5) At 28 days of curing concrete attains a strength of _____.
a) 20 to 25%
b) 60 to 70%
c) 65 to 80%
d) 90 to 95%
- 6) Which of the following is not a composition of cement?
a) Tri-calcium silicate
b) Di-calcium silicate
c) Di-calcium aluminate
d) Tri-calcium aluminate

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
CIVIL ENGINEERING

Concrete Technology, Material Testing & Evaluation (BTN01303)

Day & Date: Wednesday 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All Questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any two of the following. **12**

- a) Explain in detail Wet Process of Manufacturing of cement with neat sketch.
- b) Explain briefly workability of concrete. Explain any one methods of determination of workability.
- c) Explain about plasticizers and super-plasticizers.

Q.3 Attempt any Four of the following **16**

- a) Explain sulphate and chloride attack on concrete
- b) Explain in detail factors affecting durability of concrete.
- c) Explain the Methods of compaction of concrete.
- d) Explain in brief factors affecting strength of concrete.
- e) Explain in brief bulking of the sand.

Section – II

Q.4 Attempt any Three of the following **12**

- a) Explain creep of Concrete & factors affecting creep.
- b) Factor affecting Shrinkage of concrete
- c) Explain permeability of concrete
- d) Explain Flexural test on tiles

Q.5 a) Write a step-by-step procedure of designing concrete mix by ACI method. **16**

OR

- b) Design M 20 concrete mix as per IS: 10262-2009 using following data.**
1. Grade designation : M 20
 2. Type of cement: OPC 53 grade
 3. Maximum nominal size of aggregates : 20 mm
 4. Minimum cement content: 300 kg/m³
 5. Maximum water cement ratio : 0.55
 6. Workability : 75 mm (slump)
 7. Exposure condition : Mild
 8. Degree of supervision : Good
 9. Type of aggregate : Crushed angular aggregate
 10. Maximum cement content: 450 kg/m³
 11. Chemical admixture : Not recommended
 12. Method of concrete placing-manual (pumping not required)

Test Data for Materials:

- a) Cement used : OPC 53 grade
- b) Specific gravity of cement: 3.15
- c) Specific gravity of
- d) Coarse aggregate : 2.70
- e) Fine aggregate : 2.68
- f) Water absorption
- Coarse aggregate : 0.5%, Fine aggregate : 1%
- g) Free (surface) moisture
- Coarse aggregate : Nil (absorbed moisture full), Fine aggregate : Nil
- h) Sieve analysis

Coarse aggregate: Conforming to Table 2 of IS : 383

Fine aggregate: Conforming to Zone I of IS : 383

Refer Table No. 1, 2, 3 and 4

Table 1 Assumed Standard Deviation (Clause 9.2.4.2 and Table 11)	
Grade of Concrete	Assumed Standard Deviation N/mm ²
M 10	3.5
M 15	
M 20	4.0
M 25	
M 30	5.0
M 35	
M 40	
M 45	
M 50	

Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate (Clauses 4.2, A - 5 and B - 5)		
Sl. No.	Nominal Maximum Size of Aggregate mm	Maximum water Content* kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

Note : These quantities of mixing water are for use in computing cementitious material contents for trial batches.

*Water } content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit
Volume of Total Aggregate for Different
Zones of Fine Aggregate
(Clauses 4.4, A-7 and B-7)**

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate *per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

*Volumes are based on aggregates in saturated surface dry condition.

**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of
Concrete for Different Exposures with Normal Weight Aggregates of 20 mm
Nominal (maximum size)
(Clauses 6.1.2, 8.2.4.1 and 9.1.2)**

Sl. No.	Exposure	Plain Concrete		Reinforced Concrete			
		Minimum Cement Content kg/m ³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete	Minimum Cement content kg/m ³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	—	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very Severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

Seat No.	
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Set Q

S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Concrete Technology, Material Testing & Evaluation (BTN01303)

Day & Date: Wednesday 15-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Shrinkage increases with _____.
 - a) Increase in the water-cement ratio
 - b) Increase in cement content
 - c) Decrease in humidity
 - d) All of the above
- 2) A mixer designated 400NT indicates that _____.
 - a) It is non-tilting type mixer
 - b) Its nominal mix batch capacity is 400 liters
 - c) Both a) and b)
 - d) It is non-tilting type mixer with 400 cum capacity
- 3) IS provision for concrete mix design is given by _____.

a) IS 10262-2009	b) IS 383-1970
c) IS 456-2000	d) IS 4031-1968
- 4) For water-cement ratio of 0.6 the water content per bag of cement is _____.

a) 10 kg	b) 20 kg
c) 30 kg	d) 40 kg
- 5) Creep is _____.

a) Time dependent	b) Time independent
c) Temperature dependent	d) None
- 6) Characteristic strength of concrete is defined as the strength of concrete below which not more than of the test results are expected to fail _____.

a) 15%	b) 5%
c) 7%	d) 10%
- 7) Tensile test can be performed on _____.

a) Impact testing machine	b) Universal testing machine
c) Rockwell Tester	d) Compression testing machine

- 8) The process of proper and accurate measurement of concrete ingredients for uniformity proportion, is known as _____.
 - a) Curing
 - b) Mixing
 - c) Grading
 - d) Batching
- 9) Admixtures which cause early setting, and hardening of concrete are called as _____.
 - a) Plasticizers
 - b) Retarders
 - c) Super-plasticizers
 - d) Accelerators
- 10) Strength of concrete increase with _____.
 - a) Increase in w/c ratio
 - b) Decrease in w/c ratio
 - c) Decrease in size of aggregates
 - d) Decrease in curing time
- 11) The choice of mix proportion of a concrete is independent of _____.
 - a) Grade designation
 - b) Maximum size of aggregate
 - c) Minimum water-cement ratio
 - d) Batching, mixing, placing and compaction techniques
- 12) At 28 days of curing concrete attains a strength of _____.
 - a) 20 to 25%
 - b) 60 to 70%
 - c) 65 to 80%
 - d) 90 to 95%
- 13) Which of the following is not a composition of cement?
 - a) Tri-calcium silicate
 - b) Di-calcium silicate
 - c) Di-calcium aluminate
 - d) Tri-calcium aluminate
- 14) The workability of concrete using compaction factor test is measured in _____.
 - a) mm
 - b) cm
 - c) min
 - d) none of the above

Seat No.	
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Set **Q**

S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING**Concrete Technology, Material Testing & Evaluation (BTN01303)**

Day & Date: Wednesday 15-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

Instructions: 1) All Questions are compulsory.
2) Figures to the right indicate full marks.

Section – I**Q.2 Attempt any two of the following. 12**

- Explain in detail Wet Process of Manufacturing of cement with neat sketch.
- Explain briefly workability of concrete. Explain any one methods of determination of workability.
- Explain about plasticizers and super-plasticizers.

Q.3 Attempt any Four of the following 16

- Explain sulphate and chloride attack on concrete
- Explain in detail factors affecting durability of concrete.
- Explain the Methods of compaction of concrete.
- Explain in brief factors affecting strength of concrete.
- Explain in brief bulking of the sand.

Section – II**Q.4 Attempt any Three of the following 12**

- Explain creep of Concrete & factors affecting creep.
- Factor affecting Shrinkage of concrete
- Explain permeability of concrete
- Explain Flexural test on tiles

Q.5 a) Write a step-by-step procedure of designing concrete mix by ACI method. 16**OR****b) Design M 20 concrete mix as per IS: 10262-2009 using following data.**

- Grade designation : M 20
- Type of cement: OPC 53 grade
- Maximum nominal size of aggregates : 20 mm
- Minimum cement content: 300 kg/m³
- Maximum water cement ratio : 0.55
- Workability : 75 mm (slump)
- Exposure condition : Mild
- Degree of supervision : Good
- Type of aggregate : Crushed angular aggregate
- Maximum cement content: 450 kg/m³
- Chemical admixture : Not recommended
- Method of concrete placing-manual (pumping not required)

Test Data for Materials:

- a) Cement used : OPC 53 grade
- b) Specific gravity of cement: 3.15
- c) Specific gravity of
- d) Coarse aggregate : 2.70
- e) Fine aggregate : 2.68
- f) Water absorption
- Coarse aggregate : 0.5%, Fine aggregate : 1%
- g) Free (surface) moisture
- Coarse aggregate : Nil (absorbed moisture full), Fine aggregate : Nil
- h) Sieve analysis

Coarse aggregate: Conforming to Table 2 of IS : 383

Fine aggregate: Conforming to Zone I of IS : 383

Refer Table No. 1, 2, 3 and 4

Table 1 Assumed Standard Deviation (Clause 9.2.4.2 and Table 11)	
Grade of Concrete	Assumed Standard Deviation N/mm ²
M 10	3.5
M 15	
M 20	4.0
M 25	
M 30	5.0
M 35	
M 40	
M 45	
M 50	

Table 2 Maximum Water Content per Cubic Metre of Concrete for Nominal Maximum Size of Aggregate (Clauses 4.2, A - 5 and B - 5)		
Sl. No.	Nominal Maximum Size of Aggregate mm	Maximum water Content* kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

Note : These quantities of mixing water are for use in computing cementitious material contents for trial batches.

*Water } content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit
Volume of Total Aggregate for Different
Zones of Fine Aggregate
(Clauses 4.4, A-7 and B-7)**

Sl. No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate *per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69

*Volumes are based on aggregates in saturated surface dry condition.

**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of
Concrete for Different Exposures with Normal Weight Aggregates of 20 mm
Nominal (maximum size)
(Clauses 6.1.2, 8.2.4.1 and 9.1.2)**

Sl. No.	Exposure	Plain Concrete		Reinforced Concrete			
		Minimum Cement Content kg/m ³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete	Minimum Cement content kg/m ³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	—	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very Severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
CIVIL ENGINEERING

Concrete Technology, Material Testing & Evaluation (BTN01303)

Day & Date: Wednesday 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All Questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any two of the following. **12**

- a) Explain in detail Wet Process of Manufacturing of cement with neat sketch.
- b) Explain briefly workability of concrete. Explain any one methods of determination of workability.
- c) Explain about plasticizers and super-plasticizers.

Q.3 Attempt any Four of the following **16**

- a) Explain sulphate and chloride attack on concrete
- b) Explain in detail factors affecting durability of concrete.
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- d) Explain in brief factors affecting strength of concrete.
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Section – II

Q.4 Attempt any Three of the following **12**

- a) Explain creep of Concrete & factors affecting creep.
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- d) Explain Flexural test on tiles

Q.5 a) Write a step-by-step procedure of designing concrete mix by ACI method. **16**

OR

- b) Design M 20 concrete mix as per IS: 10262-2009 using following data.**
1. Grade designation : M 20
 2. Type of cement: OPC 53 grade
 3. Maximum nominal size of aggregates : 20 mm
 4. Minimum cement content: 300 kg/m³
 5. Maximum water cement ratio : 0.55
 6. Workability : 75 mm (slump)
 7. Exposure condition : Mild
 8. Degree of supervision : Good
 9. Type of aggregate : Crushed angular aggregate
 10. Maximum cement content: 450 kg/m³
 11. Chemical admixture : Not recommended
 12. Method of concrete placing-manual (pumping not required)

Test Data for Materials:

- a) Cement used : OPC 53 grade
- b) Specific gravity of cement: 3.15
- c) Specific gravity of
- d) Coarse aggregate : 2.70
- e) Fine aggregate : 2.68
- f) Water absorption
- Coarse aggregate : 0.5%, Fine aggregate : 1%
- g) Free (surface) moisture
- Coarse aggregate : Nil (absorbed moisture full), Fine aggregate : Nil
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Coarse aggregate: Conforming to Table 2 of IS : 383

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Note : These quantities of mixing water are for use in computing cementitious material contents for trial batches.

*Water } content corresponding to saturated surface dry aggregate.

**Table 3 Volume of Coarse Aggregate per unit
Volume of Total Aggregate for Different
Zones of Fine Aggregate
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Concrete for Different Exposures with Normal Weight Aggregates of 20 mm
Nominal (maximum size)
(Clauses 6.1.2, 8.2.4.1 and 9.1.2)**

Sl. No.	Exposure	Plain Concrete		Reinforced Concrete			
		Minimum Cement Content kg/m ³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete	Minimum Cement content kg/m ³	Maximum Free Water- Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	—	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very Severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

Seat No.	
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Set	S
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Concrete Technology, Material Testing & Evaluation (BTN01303)

Day & Date: Wednesday 15-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Which of the following is not a composition of cement?
a) Tri-calcium silicate b) Di-calcium silicate
c) Di-calcium aluminate d) Tri-calcium aluminate
- 2) The workability of concrete using compaction factor test is measured in _____.
a) mm b) cm
c) min d) none of the above
- 3) Shrinkage increases with _____.
a) Increase in the water-cement ratio
b) Increase in cement content
c) Decrease in humidity
d) All of the above
- 4) A mixer designated 400NT indicates that _____.
a) It is non-tilting type mixer
b) Its nominal mix batch capacity is 400 liters
c) Both a) and b)
d) It is non-tilting type mixer with 400 cum capacity
- 5) IS provision for concrete mix design is given by _____.
a) IS 10262-2009 b) IS 383-1970
c) IS 456-2000 d) IS 4031-1968
- 6) For water-cement ratio of 0.6 the water content per bag of cement is _____.
a) 10 kg b) 20 kg
c) 30 kg d) 40 kg
- 7) Creep is _____.
a) Time dependent b) Time independent
c) Temperature dependent d) None

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
CIVIL ENGINEERING

Concrete Technology, Material Testing & Evaluation (BTN01303)

Day & Date: Wednesday 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All Questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any two of the following. **12**

- a) Explain in detail Wet Process of Manufacturing of cement with neat sketch.
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- a) Explain sulphate and chloride attack on concrete
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Section – II

Q.4 Attempt any Three of the following **12**

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Q.5 a) Write a step-by-step procedure of designing concrete mix by ACI method. **16**

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- a) Cement used : OPC 53 grade
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- d) Coarse aggregate : 2.70
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Coarse aggregate: Conforming to Table 2 of IS : 383

Fine aggregate: Conforming to Zone I of IS : 383

Refer Table No. 1, 2, 3 and 4

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Note : These quantities of mixing water are for use in computing cementitious material contents for trial batches.		
*Water } content corresponding to saturated surface dry aggregate.		

**Table 3 Volume of Coarse Aggregate per unit
Volume of Total Aggregate for Different
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iii)	40	0.75	0.73	0.71	0.69

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**Table 4 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of
Concrete for Different Exposures with Normal Weight Aggregates of 20 mm
Nominal (maximum size)
(Clauses 6.1.2, 8.2.4.1 and 9.1.2)**

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iv)	Very Severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

**Seat
No.**

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each Questions carry one mark.
 - 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct alternative

14

- The relation between modulus of elasticity (E), modulus of rigidity (G) and bulk modulus (K) is given as _____.
 - $K+G / (3K+ G)$
 - $3 KG / (3K+ G)$
 - $3 KG / (9K+ G)$
 - $9 KG/(3K+G)$
- Modulus of rigidity is the ratio of _____.
 - Lateral strain and linear strain
 - linear stress and lateral strain
 - Shear stress and shear Strain
 - Shear strain and shear stress
- The value on shear stress on principal plane is _____.
 - Zero
 - Maximum
 - Minimum but positive
 - Average value
- The point of contra flexure is the point where _____.
 - B.M. changes its sign
 - B.M. is minimum
 - S.F. is zero
 - B.M. is maximum
- A simply supported beam carries couple at a point on its span the shear force is _____.
 - Varies by cubic law
 - Varies by parabolic law
 - Varies linearly
 - Is uniform throughout
- In the torsion formula $\frac{T}{J} = \frac{\tau}{R} = \frac{C\theta}{l}$ the term $\frac{J}{R}$ is called _____.
 - Shear modulus
 - Section Modulus
 - polar modulus
 - None of these.
- A Shaft is simultaneously subjected to torque T and bending moment M . The ratio of maximum shear stress to bending stress is _____.
 - M/T
 - T/M
 - $2M/T$
 - $T/2M$

Seat No.	
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Set **P**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Structural Mechanics – I (BTN01305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
 2) In Section - II, Q. No. 6 is compulsory and solve any TWO questions from remaining questions (Q. No. 7, 8 & 9).
 3) Figures to right indicate full marks.
 4) Assume suitable data is necessary and mention it clearly

Section – I

- Q.2** A rigid beam AB, 3 m long is hinged at A and B supported by two wires CD and EF as in Fig. If a load of 3kN is applied at B, find the stress developed in each wire. The wires are 3 mm in diameter, E of wire = 200 GPa. **10**

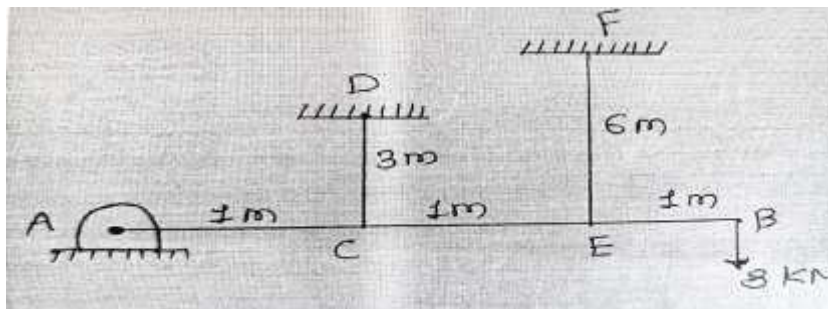


Fig. - I

- Q.3** At a point in a strained material the principal stress are 100 N/mm^2 (tensile) and 50 N/mm^2 (comp). Determine the normal stress, shear stress & Resultant stress on a plane inclined at 50° to the axis of major principal stress also determine the maximum shear stress at the point. **09**
- Q.4** A circular solid shaft transmits 115 k watt at 300 r.p.m. A permissible shear stress is 75 N/mm^2 and allowable twist 1.5° in a 3 meter. Take $G=82 \times 10^5 \text{ N/mm}^2$. Determine diameter of shaft Based on i) Shear stress, ii) Angle of twist. **09**
- Q.5** Define the following Write any three of the following. **09**
- Hooke's Law
 - Polar sectional modulus
 - Draw Stress strain relationship for mild steel
 - Maximum Principal stress theory
 - Maximum Principal Strain theory

Section – II

Q.6 Draw SFD and BMD for a beam as shown in fig-II.

10

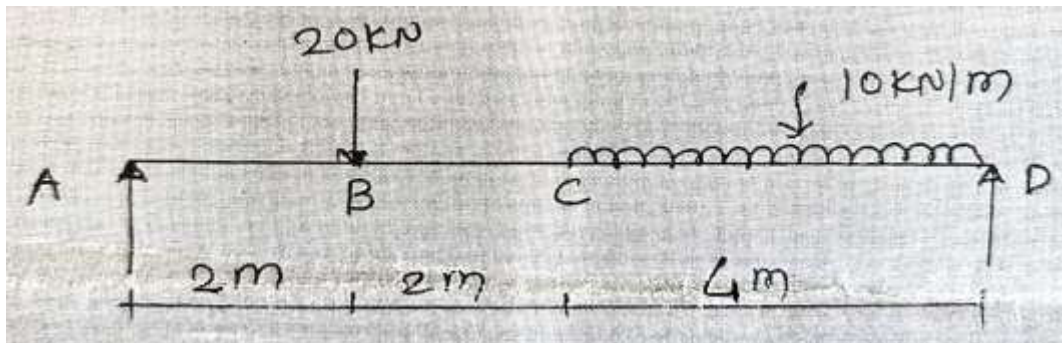


Fig. - II

Q.7 A symmetric I section is 150 mm wide and 200 mm deep. The flange thickness and web thickness is 10 mm. this section is used for cantilever beam having a span of 3 m and subjected to uniformly distributed load. Find the maximum u.d.l. that can be supported if $E = 200 \text{ GPa}$ and maximum allowable stress is 180 MPa.

09

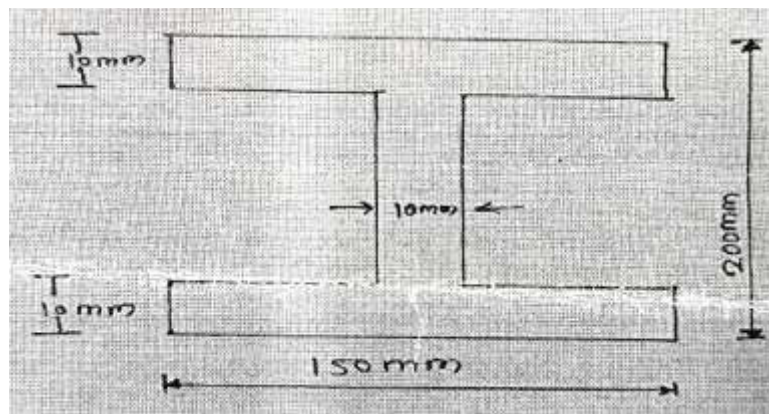


Fig. - III

Q.8 A simply supported beam of span 4 m. Carries UDL of 80 kN/m over the entire span. Draw the shear stress distribution diagram at support indicating all important values Refer fig..

09

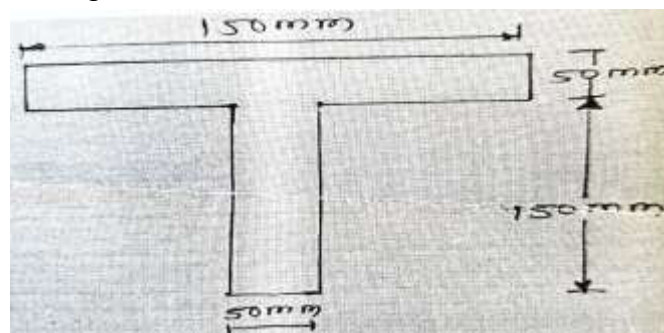


Fig. - IV

Q.9 A beam of AB of length 9 m is partly loaded with U.D.L. of 15 kN/m upto 3 m from A and a point load of 40 kN is acting at 6 m from A. Find the reaction at A and B by using influence line diagram.

09

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Structural Mechanics – I (BTN01305)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each Questions carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
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Marks: 14

14

- Page 5 of 16

- 8) The relation between modulus of elasticity (E), modulus of rigidity (G) and bulk modulus (K) is given as _____.
 a) $K+G / (3K+ G)$ b) $3 KG / (3K+ G)$
 c) $3 KG / (9K+ G)$ d) $9 KG/(3K+G)$
- 9) Modulus of rigidity is the ratio of _____.
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 a) Zero b) Maximum
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- 11) The point of contra flexure is the point where _____.
 a) B.M. changes its sign
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- 12) A simply supported beam carries couple at a point on its span the shear force is _____.
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 a) Shear modulus b) Section Modulus
 c) polar modulus d) None of these.
- 14) A Shaft is simultaneously subjected to torque T and bending moment M. The ratio of maximum shear stress to bending stress is _____.
 a) M/T b) T/M
 c) $2M/T$ d) $T/2M$

Seat No.	
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Set **Q**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Structural Mechanics – I (BTN01305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
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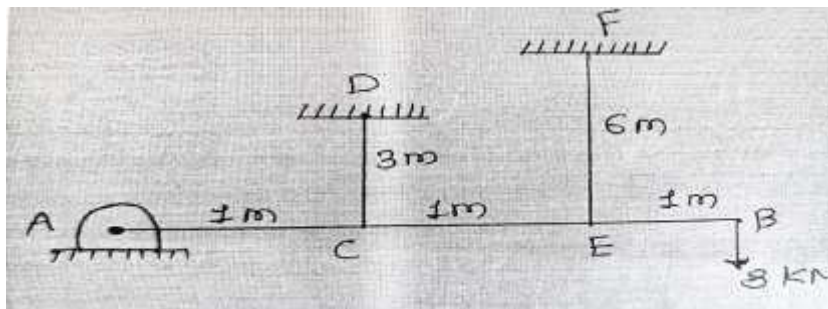


Fig. - I

- Q.3** At a point in a strained material the principal stress are 100 N/mm^2 (tensile) and 50 N/mm^2 (comp). Determine the normal stress, shear stress & Resultant stress on a plane inclined at 50° to the axis of major principal stress also determine the maximum shear stress at the point. **09**
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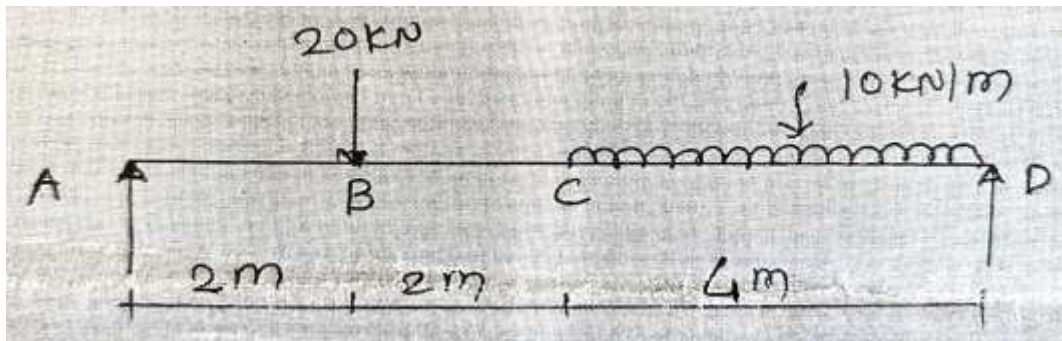


Fig. - II

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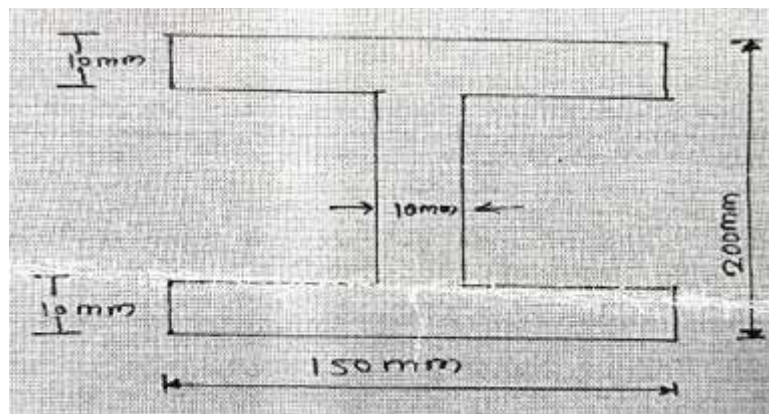


Fig. - III

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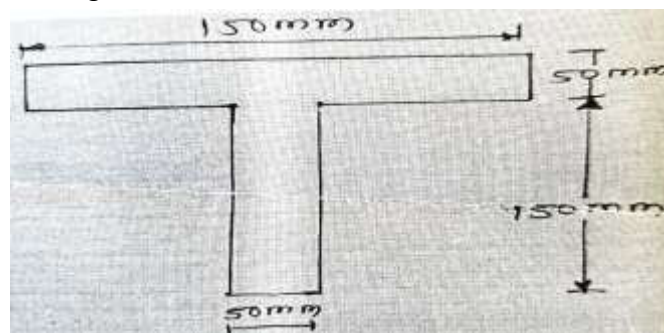


Fig. - IV

Q.9 A beam of AB of length 9 m is partly loaded with U.D.L. of 15 kN/m upto 3 m from A and a point load of 40 kN is acting at 6 m from A. Find the reaction at A and B by using influence line diagram.

09

Seat No.	
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Set **R****S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024****CIVIL ENGINEERING****Structural Mechanics – I (BTN01305)**

Day & Date: Thursday, 16-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each Questions carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct alternative**14**

- 1) As per assumption of theory of bending, the beam is subjected to _____.
 - a) Pure bending
 - b) Pure shear
 - c) Pure tension
 - d) Simple shear
- 2) Maximum principle stress theory satisfactory results for _____.
 - a) Ductile material
 - b) Brittle material
 - c) Elastic material
 - d) None of the above
- 3) For which structure influence line are drawn?
 - a) Statically in determinate structure
 - b) Statically Determinate
 - c) Pin Jointed Truss
 - d) All of the above
- 4) If unit loads move from left to right on S.S. beam the nature of ILD for reaction is?
 - a) Parabolic
 - b) Hyperbolic
 - c) Inclined straight line
 - d) Horizontal Straight line
- 5) The relation between modulus of elasticity (E), modulus of rigidity (G) and bulk modulus (K) is given as _____.
 - a) $K+G / (3K+ G)$
 - b) $3 KG / (3K+ G)$
 - c) $3 KG / (9K+ G)$
 - d) $9 KG/(3K+G)$
- 6) Modulus of rigidity is the ratio of _____.
 - a) Lateral strain and linear strain
 - b) linear stress and lateral strain
 - c) Shear stress and shear Strain
 - d) Shear strain and shear stress
- 7) The value on shear stress on principal plane is _____.
 - a) Zero
 - b) Maximum
 - c) Minimum but positive
 - d) Average value

- 8) The point of contra flexure is the point where _____.
a) B.M. changes its sign
b) B.M. is minimum
c) S.F. is zero
d) B.M. is maximum
- 9) A simply supported beam carries couple at a point on its span the shear force is _____.
a) Varies by cubic law
b) Varies by parabolic law
c) Varies linearly
d) Is uniform throughout
- 10) In the torsion formula $\frac{T}{J} = \frac{\tau}{R} = \frac{C\theta}{l}$ the term $\frac{J}{R}$ is called _____.
a) Shear modulus
b) Section Modulus
c) polar modulus
d) None of these.
- 11) A Shaft is simultaneously subjected to torque T and bending moment M. The ratio of maximum shear stress to bending stress is _____.
a) M/T
b) T/M
c) 2M/T
d) T/2M
- 12) Maximum Principal strain energy theory is also known as _____.
a) Rankine theory
b) Tresca Theory
c) Von mises Henky theory
d) Saint Venant theory
- 13) Where the bending section of beam is zero _____.
a) Top fiber
b) Bottom Fiber
c) Depend on the section of beam
d) centroid of the section
- 14) The strength of beam section is determined by its _____.
a) Compressive stress
b) Section modulus
c) Shear modulus
d) Tensile stress

Seat No.	
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Set **R**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Structural Mechanics – I (BTN01305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
 2) In Section - II, Q. No. 6 is compulsory and solve any TWO questions from remaining questions (Q. No. 7, 8 & 9).
 3) Figures to right indicate full marks.
 4) Assume suitable data is necessary and mention it clearly

Section – I

- Q.2** A rigid beam AB, 3 m long is hinged at A and B supported by two wires CD and EF as in Fig. If a load of 3kN is applied at B, find the stress developed in each wire. The wires are 3 mm in diameter, E of wire = 200 GPa. **10**

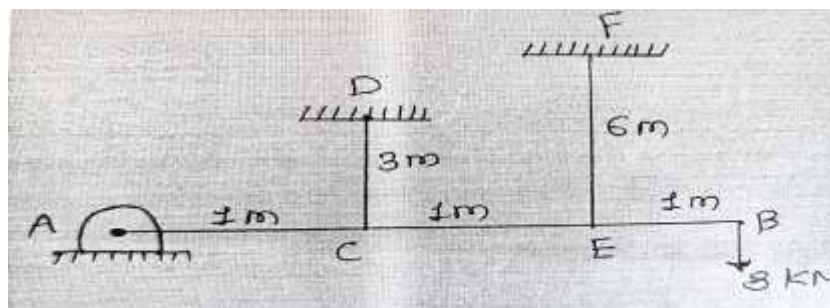


Fig. - I

- Q.3** At a point in a strained material the principal stress are 100 N/mm^2 (tensile) and 50 N/mm^2 (comp). Determine the normal stress, shear stress & Resultant stress on a plane inclined at 50° to the axis of major principal stress also determine the maximum shear stress at the point. **09**
- Q.4** A circular solid shaft transmits 115 k watt at 300 r.p.m. A permissible shear stress is 75 N/mm^2 and allowable twist 1.5° in a 3 meter. Take $G=82 \times 10^5 \text{ N/mm}^2$. Determine diameter of shaft Based on i) Shear stress, ii) Angle of twist. **09**
- Q.5** Define the following Write any three of the following. **09**
- Hooke's Law
 - Polar sectional modulus
 - Draw Stress strain relationship for mild steel
 - Maximum Principal stress theory
 - Maximum Principal Strain theory

Section – II

Q.6 Draw SFD and BMD for a beam as shown in fig-II.

10

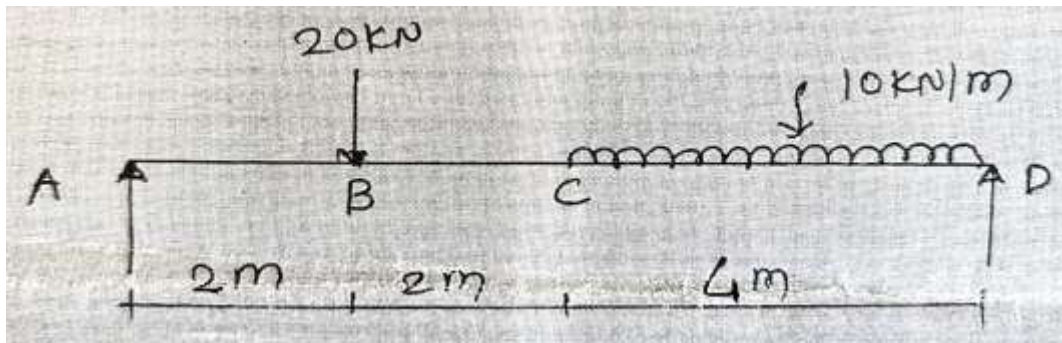


Fig. - II

Q.7 A symmetric I section is 150 mm wide and 200mm deep. The flange thickness and web thickness is 10 mm. this section is used for cantilever beam having a span of 3 m and subjected to uniformly distributed load. Find the maximum u.d.l. that can be supported if $E = 200\text{GPa}$ and maximum allowable stress is 180 MPa.

09

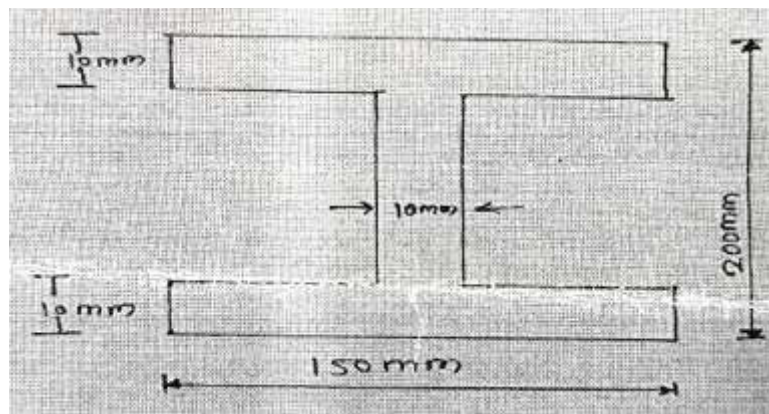


Fig. - III

Q.8 A simply supported beam of span 4 m. Carries UDL of 80 kN/m over the entire span. Draw the shear stress distribution diagram at support indicating all important values Refer fig..

09

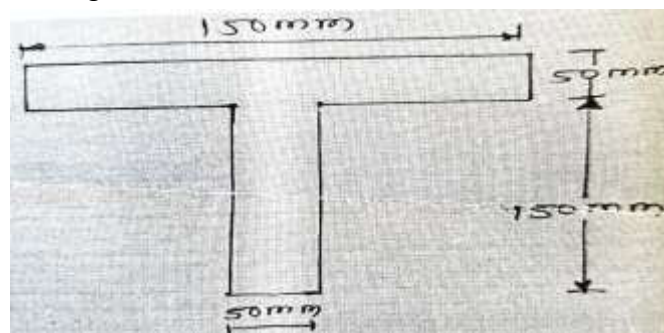


Fig. - IV

Q.9 A beam of AB of length 9 m is partly loaded with U.D.L. of 15 kN/m upto 3 m from A and a point load of 40 kN is acting at 6 m from A. Find the reaction at A and B by using influence line diagram.

09

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Structural Mechanics – I (BTN01305)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each Questions carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
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Marks: 14

14

- Page 13 of 16

- 8) For which structure influence line are drawn?
a) Statically in determinate structure
b) Statically Determinate
c) Pin Jointed Truss
d) All of the above
- 9) If unit loads move from left to right on S.S. beam the nature of ILD for reaction is?
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- 10) The relation between modulus of elasticity (E), modulus of rigidity (G) and bulk modulus (K) is given as _____.
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- 12) The value on shear stress on principal plane is _____.
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b) Maximum
c) Minimum but positive
d) Average value
- 13) The point of contra flexure is the point where _____.
a) B.M. changes its sign
b) B.M. is minimum
c) S.F. is zero
d) B.M. is maximum
- 14) A simply supported beam carries couple at a point on its span the shear force is _____.
a) Varies by cubic law
b) Varies by parabolic law
c) Varies linearly
d) Is uniform throughout

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Structural Mechanics – I (BTN01305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
 2) In Section - II, Q. No. 6 is compulsory and solve any TWO questions from remaining questions (Q. No. 7, 8 & 9).
 3) Figures to right indicate full marks.
 4) Assume suitable data is necessary and mention it clearly

Section – I

- Q.2** A rigid beam AB, 3 m long is hinged at A and B supported by two wires CD and EF as in Fig. If a load of 3kN is applied at B, find the stress developed in each wire. The wires are 3 mm in diameter, E of wire = 200 GPa. **10**

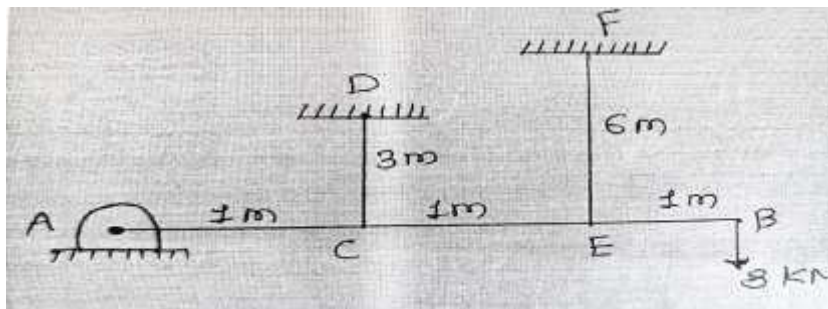


Fig. - I

- Q.3** At a point in a strained material the principal stress are 100 N/mm^2 (tensile) and 50 N/mm^2 (comp). Determine the normal stress, shear stress & Resultant stress on a plane inclined at 50° to the axis of major principal stress also determine the maximum shear stress at the point. **09**
- Q.4** A circular solid shaft transmits 115 k watt at 300 r.p.m. A permissible shear stress is 75 N/mm^2 and allowable twist 1.5° in a 3 meter. Take $G=82 \times 10^5 \text{ N/mm}^2$. Determine diameter of shaft Based on i) Shear stress, ii) Angle of twist. **09**
- Q.5** Define the following Write any three of the following. **09**
- Hooke's Law
 - Polar sectional modulus
 - Draw Stress strain relationship for mild steel
 - Maximum Principal stress theory
 - Maximum Principal Strain theory

Section – II

Q.6 Draw SFD and BMD for a beam as shown in fig-II.

10

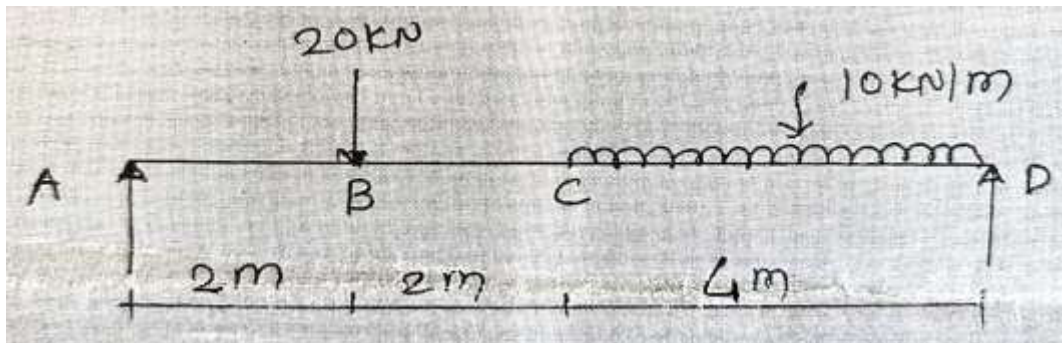


Fig. - II

Q.7 A symmetric I section is 150 mm wide and 200 mm deep. The flange thickness and web thickness is 10 mm. this section is used for cantilever beam having a span of 3 m and subjected to uniformly distributed load. Find the maximum u.d.l. that can be supported if $E = 200 \text{ GPa}$ and maximum allowable stress is 180 MPa.

09

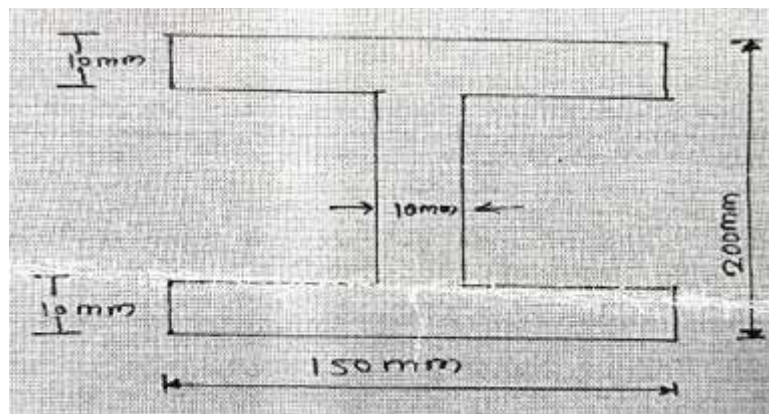


Fig. - III

Q.8 A simply supported beam of span 4 m. Carries UDL of 80 kN/m over the entire span. Draw the shear stress distribution diagram at support indicating all important values Refer fig..

09

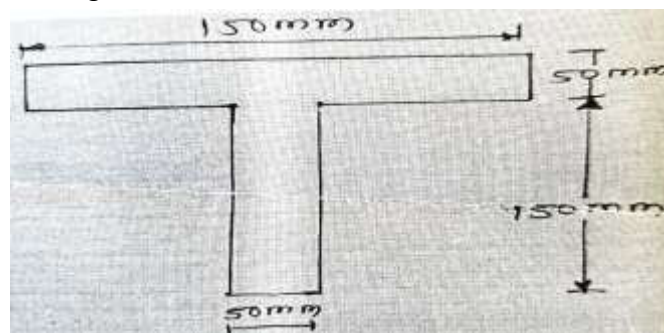


Fig. - IV

Q.9 A beam of AB of length 9 m is partly loaded with U.D.L. of 15 kN/m upto 3 m from A and a point load of 40 kN is acting at 6 m from A. Find the reaction at A and B by using influence line diagram.

09

Seat No.	
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Set	P
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Building Construction & Drawing (BTN01304)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 07:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 - 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume correct data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 State whether following statements are correct or incorrect.

14

- 1) Extrados is inner curve of an arch.
- 2) Casing and capping are type of closed wiring.
- 3) Spouts are provided for transportation of bathroom waste water.
- 4) Normally for plastering mortar of CM 1:4 is used.
- 5) The height of kitchen should be 2.75 m from floor to lower point of ceiling.
- 6) For the row type of building the minimum plot size should be 50 sq.m. 125 sq.m.
- 7) The area of a both rooms shall not be less than 1.8 sq.m.
- 8) Purpose to providing traps in drainage system to avoid entry foul gases in building.
- 9) Plastering is the process of covering rough surfaces of wall, column, and ceiling etc.
- 10) The term pointing is applied to the finishing of mortar joints in masonry.
- 11) Driers are used to accelerate the process of drying in painting.
- 12) The area of a kitchen shall not be more than 2.2 sq.m.
- 13) Roof sloping in two directions is called as hip roof.
- 14) A.C. sheets mean Asian Cement sheets.

Seat No.	
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Set	P
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Building Construction & Drawing (BTN01304)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 07:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figure to right indicate full marks.
3) Assume correct data wherever necessary.

Section – I

Q.2 Write the answers for followings (Any Seven)

28

- a) What is through stone? Explain its importance in masonry work.
- b) Compare Load bearing structure with framed structure.
- c) Draw neat sketches for any two of door hinges.
- d) Explain system of Air - Conditioning in winter.
- e) Write a note on various defects in plastering.
- f) Write a note on: Thermal Insulation of Building.
- g) Draw a neat sketch of Gully Trap and Intercepting Trap.
- h) Define following terms:
 - i) Queen Closer
 - ii) King Closer
 - iii) Closer
 - iv) Bevelled closer
- i) Enlist various types of roofs. Discuss any two types of roofs with their suitability.
- j) What is concept of earthing? Also explain procedure of earthing in brief.

Section – II

- Q.3 a)** Draw to scale of 1:10, detailed section, front elevation, and sectional elevation for farmed T.W. Double leaf door full panelled. Use following data (All dimensions are in mm).
- i) Clear opening = 1200 x 2100
 - ii) Wood section for frame = 100 x 75
 - iii) Wood section for styles and rails = 100 x 40
 - iv) Obscured Glass = 5 mm thick at top-side of shutter
 - v) Panel - 20 mm thick plywood
 - vi) Show various fixtures at proper location.

14

OR

Draw to the scale of 1 : 10 elevation and plan of alternate course of 'L' shaped one brick and one and half brick thick wall in English bond.

- Q.3 b)** Design and draw to scale 1 : 30, plan and vertical section for Dog-legged R.C.C. stair for residential building. Use following data: **14**
- i) Storey height = 3100 mm
 - ii) Width of flight = 1000 mm
 - iii) Railing - 50 mm thick RCC Pardi
 - iv) Reinforcement details not necessary
 - v) Write step by step calculation on sheet with pencil only.

OR

Draw to scale 1 : 20 cross section of a RCC slab floor with ceramic tile flooring laid on cement mortar bed with cement float. Use following data and dimension.

- i) RCC slab thickness = 150 mm
- ii) Cement mortar bed thickness = 30 mm
- iii) Cement float thickness = 02 mm
- iv) Ceramic tile thickness = 15 mm
- v) Ceramic tile size in plan = 300 x 300 mm

Seat No.	
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Set	Q
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Building Construction & Drawing (BTN01304)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 07:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 State whether following statements are correct or incorrect.

14

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- 5) The height of kitchen should be 2.75 m from floor to lower point of ceiling.
- 6) For the row type of building the minimum plot size should be 50 sq.m. 125 sq.m.
- 7) The area of a both rooms shall not be less than 1.8 sq.m.
- 8) Purpose to providing traps in drainage system to avoid entry foul gases in building.
- 9) Plastering is the process of covering rough surfaces of wall, column, and ceiling etc.
- 10) The term pointing is applied to the finishing of mortar joints in masonry.
- 11) Driers are used to accelerate the process of drying in painting.
- 12) The area of a kitchen shall not be more than 2.2 sq.m.
- 13) Roof sloping in two directions is called as hip roof.
- 14) A.C. sheets mean Asian Cement sheets.

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**CIVIL ENGINEERING****Building Construction & Drawing (BTN01304)**

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 07:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figure to right indicate full marks.
 3) Assume correct data wherever necessary.

Section – I**Q.2 Write the answers for followings (Any Seven)****28**

- a) What is through stone? Explain its importance in masonry work.
- b) Compare Load bearing structure with framed structure.
- c) Draw neat sketches for any two of door hinges.
- d) Explain system of Air - Conditioning in winter.
- e) Write a note on various defects in plastering.
- f) Write a note on: Thermal Insulation of Building.
- g) Draw a neat sketch of Gully Trap and Intercepting Trap.
- h) Define following terms:
 - i) Queen Closer
 - ii) King Closer
 - iii) Closer
 - iv) Bevelled closer
- i) Enlist various types of roofs. Discuss any two types of roofs with their suitability.
- j) What is concept of earthing? Also explain procedure of earthing in brief.

Section – II

Q.3 a) Draw to scale of 1:10, detailed section, front elevation, and sectional elevation for farmed T.W. Double leaf door full panelled. Use following data (All dimensions are in mm).

14

- i) Clear opening = 1200 x 2100
- ii) Wood section for frame = 100 x 75
- iii) Wood section for styles and rails = 100 x 40
- iv) Obscured Glass = 5 mm thick at top-side of shutter
- v) Panel - 20 mm thick plywood
- vi) Show various fixtures at proper location.

OR

Draw to the scale of 1 : 10 elevation and plan of alternate course of 'L' shaped one brick and one and half brick thick wall in English bond.

- Q.3 b)** Design and draw to scale 1 : 30, plan and vertical section for Dog-legged R.C.C. stair for residential building. Use following data: **14**
- i) Storey height = 3100 mm
 - ii) Width of flight = 1000 mm
 - iii) Railing - 50 mm thick RCC Pardi
 - iv) Reinforcement details not necessary
 - v) Write step by step calculation on sheet with pencil only.

OR

Draw to scale 1 : 20 cross section of a RCC slab floor with ceramic tile flooring laid on cement mortar bed with cement float. Use following data and dimension.

- i) RCC slab thickness = 150 mm
- ii) Cement mortar bed thickness = 30 mm
- iii) Cement float thickness = 02 mm
- iv) Ceramic tile thickness = 15 mm
- v) Ceramic tile size in plan = 300 x 300 mm

Seat No.	
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Set	R
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Building Construction & Drawing (BTN01304)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 07:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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- 12) The area of a kitchen shall not be more than 2.2 sq.m.
- 13) Roof sloping in two directions is called as hip roof.
- 14) A.C. sheets mean Asian Cement sheets.

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**CIVIL ENGINEERING****Building Construction & Drawing (BTN01304)**

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 07:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figure to right indicate full marks.
 3) Assume correct data wherever necessary.

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Section – II

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- iv) Ceramic tile thickness = 15 mm
- v) Ceramic tile size in plan = 300 x 300 mm

Seat No.	
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Set	S
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Building Construction & Drawing (BTN01304)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 07:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

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- 11) Driers are used to accelerate the process of drying in painting.
- 12) The area of a kitchen shall not be more than 2.2 sq.m.
- 13) Roof sloping in two directions is called as hip roof.
- 14) A.C. sheets mean Asian Cement sheets.

Seat No.	
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Set	S
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

CIVIL ENGINEERING

Building Construction & Drawing (BTN01304)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 07:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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3) Assume correct data wherever necessary.

Section – I

Q.2 Write the answers for followings (Any Seven) 28

- a) What is through stone? Explain its importance in masonry work.
- b) Compare Load bearing structure with framed structure.
- c) Draw neat sketches for any two of door hinges.
- d) Explain system of Air - Conditioning in winter.
- e) Write a note on various defects in plastering.
- f) Write a note on: Thermal Insulation of Building.
- g) Draw a neat sketch of Gully Trap and Intercepting Trap.
- h) Define following terms:
 - i) Queen Closer
 - ii) King Closer
 - iii) Closer
 - iv) Bevelled closer
- i) Enlist various types of roofs. Discuss any two types of roofs with their suitability.
- j) What is concept of earthing? Also explain procedure of earthing in brief.

Section – II

Q.3 a) 14

Draw to scale of 1:10, detailed section, front elevation, and sectional elevation for farmed T.W. Double leaf door full panelled. Use following data (All dimensions are in mm).

- i) Clear opening = 1200 x 2100
- ii) Wood section for frame = 100 x 75
- iii) Wood section for styles and rails = 100 x 40
- iv) Obscured Glass = 5 mm thick at top-side of shutter
- v) Panel - 20 mm thick plywood
- vi) Show various fixtures at proper location.

OR

Draw to the scale of 1 : 10 elevation and plan of alternate course of 'L' shaped one brick and one and half brick thick wall in English bond.

- Q.3 b)** Design and draw to scale 1 : 30, plan and vertical section for Dog-legged R.C.C. stair for residential building. Use following data: **14**
- i) Storey height = 3100 mm
 - ii) Width of flight = 1000 mm
 - iii) Railing - 50 mm thick RCC Pardi
 - iv) Reinforcement details not necessary
 - v) Write step by step calculation on sheet with pencil only.

OR

Draw to scale 1 : 20 cross section of a RCC slab floor with ceramic tile flooring laid on cement mortar bed with cement float. Use following data and dimension.

- i) RCC slab thickness = 150 mm
- ii) Cement mortar bed thickness = 30 mm
- iii) Cement float thickness = 02 mm
- iv) Ceramic tile thickness = 15 mm
- v) Ceramic tile size in plan = 300 x 300 mm

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Environmental Engineering – I (BTN01401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) CO_3^{2-} in water indicates _____.
 a) Acidity in water b) Alkalinity in water
 c) Acidity and alkalinity in water d) None of the above
- 2) For ideal settling basin V_s is settling velocity. If particle is having settling velocity (V_s') less than V_s , then particle will remove with _____.
 a) Less than 100% b) 100%
 c) 0% d) None of the above
- 3) Tube settlers are installed in the sedimentation tank to _____.
 a) Increase detention time
 b) Reduce Surface loading
 c) Both a) and b)
 d) None of the above
- 4) Zeolite is _____.
 a) A naturally occurring salt b) Hydrated silica
 c) Dehydrated calcium silicate d) Silicon carbide
- 5) Air binding phenomena in rapid sand filter may occur due to _____.
 a) Excessive negative pressure b) Mud ball formation
 c) Higher turbidity in the effluent d) None of above
- 6) Precipitation of non-carbonate hardness is done by addition of _____.
 a) Soda ash b) Lime
 c) Zeolites d) Sodium chloride
- 7) Reflux valves are also known as _____ valves
 a) Shut off b) Check
 c) Cut off d) Air relief
- 8) For a city developed haphazardly, the layout of distribution pipes preferred to is _____.
 a) Radial system b) Ring system
 c) Deadend system d) Iron grid system

- 9) Water losses in water supply distribution network is assumed as _____.
 - a) 5%
 - b) 10%
 - c) 15%
 - d) 20%
- 10) At break point of chlorination _____.
 - a) chlorine is used to oxidize
 - b) residual chloride is zero
 - c) residual chlorine reappears
 - d) residual chloride is maximum
- 11) In a rapid sand filter, air binding is caused due to excessive _____.
 - a) negative pressure
 - b) water pressure
 - c) positive pressure
 - d) atmospheric pressure
- 12) To control the wastage of water _____ measures are taken.
 - a) Pipe joints
 - b) Water taps
 - c) Zoning system
 - d) All of the above
- 13) Generally, _____ water supply will reduce water demand of a city.
 - a) Continuous
 - b) Intermittent
 - c) Both a) and b)
 - d) None of the above
- 14) Analysis of pipe networks of distribution system is calculated by _____.
 - a) Discharge in pipelines
 - b) Equivalent pipe method
 - c) Computation of pressure
 - d) Mass curve method

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

CIVIL ENGINEERING

Environmental Engineering – I (BTN01401)

Day & Date: Wednesday, 22-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:**
- 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
 - 2) In Section - II, Q. No. 6 is compulsory and solve any TWO questions from remaining questions (Q. No. 7, 8 & 9).
 - 3) Figures to right indicate full marks.
 - 4) Make suitable assumptions, if required and state them clearly.
 - 5) Use of non-programmable calculator is allowed.

Section – I

- Q.2 a)** Find the population and of a city in 2041 by geometric increase method. **06**

Year	Population
1981	40,000
1991	60,000
2001	85,000
2011	1,15,000
2021	2,00,000

- b)** Calculate the fire demand for the same city having Population of year 2041 (Question No. 2 a) **04**

- Q.3 a)** A settling tank is designed for an overflow rate of 4500 lit./m²/hr. What percentage of particles of diameter (i) 0.06 mm and (ii) 0.03 mm will be removed in this tank? Temperatures of water is 10°C and specific gravity of particles 2.65. **05**

- b)** Enlist various limitations of aeration process in tropical countries. **04**

- Q.4 a)** Design underdrainage system for rapid sand filter for 26 MLD of water flow. **05**

- b)** Write short note on Ion exchange method. **04**

- Q.5 a)** Maximum daily demand of water in a city is 130 MLD. Design cascade aerator for the same. Draw plan and elevation of the aerator. Assume the inlet pipe diameter as 1.1 m. **05**

- b)** Explain water hammer pressure with a neat sketch. **04**

Section – II

- Q.6 a)** A large service reservoir supplies water to two colonies.
Colony A - Population 12000
Colony B - Population 60000
Determine the diameter of supply pipe. Average daily demand is 200 lpcd. **05**

- b)** Discuss intermittent water supply system. **05**

Q.7	a)	Write short note on	05
		i) Action of bleaching powder	
		ii) Chloramines	
	b)	Discuss the various methods of Disinfection.	04
Q.8	a)	Discuss Packaged drinking water plant with a neat diagram.	05
	b)	Explain various methods of Membrane Filtration.	04
Q.9	a)	Explain the various types of storage reservoirs.	05
	b)	Discuss the different types of losses in pipes.	04

**Seat
No.**

Page 5 of 16

- 10)** Tube settlers are installed in the sedimentation tank to _____.
a) Increase detention time
b) Reduce Surface loading
c) Both a) and b)
d) None of the above
- 11)** Zeolite is _____.
a) A naturally occurring salt b) Hydrated silica
c) Dehydrated calcium silicate d) Silicon carbide
- 12)** Air binding phenomena in rapid sand filter may occur due to _____.
a) Excessive negative pressure b) Mud ball formation
c) Higher turbidity in the effluent d) None of above
- 13)** Precipitation of non-carbonate hardness is done by addition of _____.
a) Soda ash b) Lime
c) Zeolites d) Sodium chloride
- 14)** Reflux valves are also known as _____ valves
a) Shut off b) Check
c) Cut off d) Air relief

Seat No.	
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**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

Environmental Engineering – I (BTN01401)

Day & Date: Wednesday, 22-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
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Section – I

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Year	Population
1981	40,000
1991	60,000
2001	85,000
2011	1,15,000
2021	2,00,000

- b)** Calculate the fire demand for the same city having Population of year 2041 (Question No. 2 a) **04**

- Q.3 a)** A settling tank is designed for an overflow rate of 4500 lit./m²/hr. What percentage of particles of diameter (i) 0.06 mm and (ii) 0.03 mm will be removed in this tank? Temperatures of water is 10°C and specific gravity of particles 2.65. **05**

- b)** Enlist various limitations of aeration process in tropical countries. **04**

- Q.4 a)** Design underdrainage system for rapid sand filter for 26 MLD of water flow. **05**

- b)** Write short note on Ion exchange method. **04**

- Q.5 a)** Maximum daily demand of water in a city is 130 MLD. Design cascade aerator for the same. Draw plan and elevation of the aerator. Assume the inlet pipe diameter as 1.1 m. **05**

- b)** Explain water hammer pressure with a neat sketch. **04**

Section – II

- Q.6 a)** A large service reservoir supplies water to two colonies.
Colony A - Population 12000
Colony B - Population 60000
Determine the diameter of supply pipe. Average daily demand is 200 lpcd. **05**

- b)** Discuss intermittent water supply system. **05**

Q.7	a)	Write short note on	05
		i) Action of bleaching powder	
		ii) Chloramines	
	b)	Discuss the various methods of Disinfection.	04
Q.8	a)	Discuss Packaged drinking water plant with a neat diagram.	05
	b)	Explain various methods of Membrane Filtration.	04
Q.9	a)	Explain the various types of storage reservoirs.	05
	b)	Discuss the different types of losses in pipes.	04

Seat No.	
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Set	R
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Environmental Engineering – I (BTN01401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) In a rapid sand filter, air binding is caused due to excessive _____.
 a) negative pressure b) water pressure
 c) positive pressure d) atmospheric pressure
- 2) To control the wastage of water _____ measures are taken.
 a) Pipe joints b) Water taps
 c) Zoning system d) All of the above
- 3) Generally, _____ water supply will reduce water demand of a city.
 a) Continuous b) Intermittent
 c) Both a) and b) d) None of the above
- 4) Analysis of pipe networks of distribution system is calculated by _____.
 a) Discharge in pipelines b) Equivalent pipe method
 c) Computation of pressure d) Mass curve method
- 5) CO_3^{2-} in water indicates _____.
 a) Acidity in water b) Alkalinity in water
 c) Acidity and alkalinity in water d) None of the above
- 6) For ideal settling basin V_s is settling velocity. If particle is having settling velocity (V_s') less than V_s , then particle will remove with _____.
 a) Less than 100% b) 100%
 c) 0% d) None of the above
- 7) Tube settlers are installed in the sedimentation tank to _____.
 a) Increase detention time
 b) Reduce Surface loading
 c) Both a) and b)
 d) None of the above
- 8) Zeolite is _____.
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 c) Dehydrated calcium silicate d) Silicon carbide

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c) Deaden system d) Iron grid system
- 13) Water losses in water supply distribution network is assumed as _____.
a) 5% b) 10%
c) 15% d) 20%
- 14) At break point of chlorination _____.
a) chlorine is used to oxidize b) residual chloride is zero
c) residual chlorine reappears d) residual chloride is maximum

Seat No.	
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Set	R
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Environmental Engineering – I (BTN01401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
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Section – I

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- b)** Enlist various limitations of aeration process in tropical countries. **04**

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- b)** Write short note on Ion exchange method. **04**

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- b)** Explain water hammer pressure with a neat sketch. **04**

Section – II

- Q.6 a)** A large service reservoir supplies water to two colonies.
 Colony A - Population 12000
 Colony B - Population 60000
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- b)** Discuss intermittent water supply system. **05**

Q.7	a)	Write short note on	05
		i) Action of bleaching powder	
		ii) Chloramines	
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Q.9	a)	Explain the various types of storage reservoirs.	05
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Environmental Engineering – I (BTN01401)

Max. Marks: 70

MCQ/Objective Type Questions

Marks: 14

14

- Page 13 of 16

- 10) CO_3^{2-} in water indicates _____.
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c) Acidity and alkalinity in water d) None of the above
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c) Both a) and b)
d) None of the above
- 13) Zeolite is _____.
a) A naturally occurring salt b) Hydrated silica
c) Dehydrated calcium silicate d) Silicon carbide
- 14) Air binding phenomena in rapid sand filter may occur due to _____.
a) Excessive negative pressure b) Mud ball formation
c) Higher turbidity in the effluent d) None of above

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Environmental Engineering – I (BTN01401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) In Section - I, Q. No. 2 is compulsory and solve any TWO questions from remaining questions (Q. No. 3, 4 & 5).
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 5) Use of non-programmable calculator is allowed.

Section – I

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- b)** Enlist various limitations of aeration process in tropical countries. **04**

- Q.4 a)** Design underdrainage system for rapid sand filter for 26 MLD of water flow. **05**

- b)** Write short note on Ion exchange method. **04**

- Q.5 a)** Maximum daily demand of water in a city is 130 MLD. Design cascade aerator for the same. Draw plan and elevation of the aerator. Assume the inlet pipe diameter as 1.1 m. **05**

- b)** Explain water hammer pressure with a neat sketch. **04**

Section – II

- Q.6 a)** A large service reservoir supplies water to two colonies.
 Colony A - Population 12000
 Colony B - Population 60000
 Determine the diameter of supply pipe. Average daily demand is 200 lpcd. **05**
- b)** Discuss intermittent water supply system. **05**

Q.7	a)	Write short note on	05
		i) Action of bleaching powder	
		ii) Chloramines	
	b)	Discuss the various methods of Disinfection.	04
Q.8	a)	Discuss Packaged drinking water plant with a neat diagram.	05
	b)	Explain various methods of Membrane Filtration.	04
Q.9	a)	Explain the various types of storage reservoirs.	05
	b)	Discuss the different types of losses in pipes.	04

Seat No.	
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Building Planning & Design (BTN01402)

Max. Marks: 35

MCQ/Objective Type Questions

Marks:07

07

- 1) For kitchen cum dining room the minimum area should be.

 - a) 5sq. m
 - b) 9.5sq. m
 - c) 6sq. m
 - d) 15sq.m
- 2) For built- up area calculations is drawn on the building permission drawing

 - a) Terrace plan
 - b) Plan
 - c) Site plan
 - d) Block plan
- 3) If object is on picture plane, then the size perspective will be.

 - a) Enlarged
 - b) Reduced
 - c) Remains same
 - d) All of the above
- 4) For Bedroom Aspect it needs at.

 - a) E-aspect
 - b) S-aspect
 - c) SW-aspect
 - d) W-aspect
- 5) The green building process can be applied to which of these?

 - a) Buildings
 - b) Materials
 - c) Interiors
 - d) All of above
- 6) The earthing wire should have

 - a) High resistance
 - b) Medium resistance
 - c) Negligible resistance
 - d) Any of the above
- 7) Combining two or more plots as a single plot is called.

 - a) Amalgamation
 - b) Frontage
 - c) Bifurcation
 - d) Building set back

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

CIVIL ENGINEERING

Building Planning & Design (BTN01402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 28

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 Attempt any Two questions. 08

- a) Enlist and explain the in brief 'Principles of Building Planning' with neat sketch.
- b) Discuss site selection criteria for a residential building.
- c) State requirements and standard dimensions of the following:
 - i) Bedroom
 - ii) Kitchen
 - iii) Toilet
 - iv) Store room
 - v) Garage
- d) Write a note on "Occupancy Certificate."

Q.3 Attempt any One 06

- a) Enlist and explain the in brief about "Types of Residential Building" with neat sketch.
- b) Explain the importance of AUTOCAD and describe any four commands of CAD.

Section – II

Q.4 Attempt any Two. 08

- a) What is "Green Building"? Explain in brief.
- b) Explain Concept and Design of Rain Water Harvesting.
- c) Write a note on "Low-cost Housing"
- d) Explain in brief "types of fire load."

Q.5 Attempt any One 06

- a) Explain reverberation and reverberation time using Sabine's formula.
- b) Enlist and explain in short materials available for "Sound Insulation."

Seat No.	
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**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

Building Planning & Design (BTN01402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 35

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 20 minutes in answer book page no. 03. Each question carries one mark.
2) Answer MCQ/Objective type question on page No. 3 only. Don't forgot to mention, Q.P. set (P/Q/R/S) on Top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data wherever necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 20 Minutes

Marks:07

Q.1 Choose the correct alternatives from the options.

07

- 1) The green building process can be applied to which of these?
 - a) Buildings
 - b) Materials
 - c) Interiors
 - d) All of above
- 2) The earthing wire should have
 - a) High resistance
 - b) Medium resistance
 - c) Negligible resistance
 - d) Any of the above
- 3) Combining two or more plots as a single plot is called.
 - a) Amalgamation
 - b) Frontage
 - c) Bifurcation
 - d) Building set back
- 4) For kitchen cum dining room the minimum area should be.
 - a) 5sq. m
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- 6) If object is on picture plane, then the size perspective will be.
 - a) Enlarged
 - b) Reduced
 - c) Remains same
 - d) All of the above
- 7) For Bedroom Aspect it needs at.
 - a) E-aspect
 - b) S-aspect
 - c) SW-aspect
 - d) W-aspect

Seat No.	
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Set Q**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****CIVIL ENGINEERING****Building Planning & Design (BTN01402)**

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 28

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 Attempt any Two questions. 08

- a) Enlist and explain the in brief 'Principles of Building Planning' with neat sketch.
- b) Discuss site selection criteria for a residential building.
- c) State requirements and standard dimensions of the following:
 - i) Bedroom
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 - iii) Toilet
 - iv) Store room
 - v) Garage
- d) Write a note on "Occupancy Certificate."

Q.3 Attempt any One 06

- a) Enlist and explain the in brief about "Types of Residential Building" with neat sketch.
- b) Explain the importance of AUTOCAD and describe any four commands of CAD.

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Q.4 Attempt any Two. 08

- a) What is "Green Building"? Explain in brief.
- b) Explain Concept and Design of Rain Water Harvesting.
- c) Write a note on "Low-cost Housing"
- d) Explain in brief "types of fire load."

Q.5 Attempt any One 06

- a) Explain reverberation and reverberation time using Sabine's formula.
- b) Enlist and explain in short materials available for "Sound Insulation."

Seat No.	
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Set R

**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

Building Planning & Design (BTN01402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 35

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 20 minutes in answer book page no. 03. Each question carries one mark.
2) Answer MCQ/Objective type question on page No. 3 only. Don't forgot to mention, Q.P. set (P/Q/R/S) on Top of page.
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MCQ/Objective Type Questions

Duration: 20 Minutes

Marks:07

Q.1 Choose the correct alternatives from the options.

07

- 1) If object is on picture plane, then the size perspective will be.

a) Enlarged	b) Reduced
c) Remains same	d) All of the above
- 2) For Bedroom Aspect it needs at.

a) E-aspect	b) S-aspect
c) SW-aspect	d) W-aspect
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a) Buildings	b) Materials
c) Interiors	d) All of above
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a) High resistance	b) Medium resistance
c) Negligible resistance	d) Any of the above
- 5) Combining two or more plots as a single plot is called.

a) Amalgamation	b) Frontage
c) Bifurcation	d) Building set back
- 6) For kitchen cum dining room the minimum area should be.

a) 5sq. m	b) 9.5sq. m
c) 6sq. m	d) 15sq.m
- 7) For built-up area calculations is drawn on the building permission drawing.

a) Terrace plan	b) Plan
c) Site plan	d) Block plan

Seat No.	
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Set	R
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**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

Building Planning & Design (BTN01402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 28

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 Attempt any Two questions. 08

- a) Enlist and explain the in brief 'Principles of Building Planning' with neat sketch.
- b) Discuss site selection criteria for a residential building.
- c) State requirements and standard dimensions of the following:
 - i) Bedroom
 - ii) Kitchen
 - iii) Toilet
 - iv) Store room
 - v) Garage
- d) Write a note on "Occupancy Certificate."

Q.3 Attempt any One 06

- a) Enlist and explain the in brief about "Types of Residential Building" with neat sketch.
- b) Explain the importance of AUTOCAD and describe any four commands of CAD.

Section – II

Q.4 Attempt any Two. 08

- a) What is "Green Building"? Explain in brief.
- b) Explain Concept and Design of Rain Water Harvesting.
- c) Write a note on "Low-cost Housing"
- d) Explain in brief "types of fire load."

Q.5 Attempt any One 06

- a) Explain reverberation and reverberation time using Sabine's formula.
- b) Enlist and explain in short materials available for "Sound Insulation."

Seat No.	
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**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

Building Planning & Design (BTN01402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 35

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 20 minutes in answer book page no. 03. Each question carries one mark.
2) Answer MCQ/Objective type question on page No. 3 only. Don't forget to mention, Q.P. set (P/Q/R/S) on Top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data wherever necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 20 Minutes

Marks:07

Q.1 Choose the correct alternatives from the options.

07

- 1) Combining two or more plots as a single plot is called.
a) Amalgamation b) Frontage
c) Bifurcation d) Building set back
- 2) For kitchen cum dining room the minimum area should be.
a) 5sq. m b) 9.5sq. m
c) 6sq. m d) 15sq.m
- 3) For built-up area calculations is drawn on the building permission drawing.
a) Terrace plan b) Plan
c) Site plan d) Block plan
- 4) If object is on picture plane, then the size perspective will be.
a) Enlarged b) Reduced
c) Remains same d) All of the above
- 5) For Bedroom Aspect it needs at.
a) E-aspect b) S-aspect
c) SW-aspect d) W-aspect
- 6) The green building process can be applied to which of these?
a) Buildings b) Materials
c) Interiors d) All of above
- 7) The earthing wire should have
a) High resistance b) Medium resistance
c) Negligible resistance d) Any of the above

Seat No.	
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Set S**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****CIVIL ENGINEERING****Building Planning & Design (BTN01402)**

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 28

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data wherever necessary and mention it clearly.

Section – I

Q.2 Attempt any Two questions. 08

- a) Enlist and explain the in brief 'Principles of Building Planning' with neat sketch.
- b) Discuss site selection criteria for a residential building.
- c) State requirements and standard dimensions of the following:
 - i) Bedroom
 - ii) Kitchen
 - iii) Toilet
 - iv) Store room
 - v) Garage
- d) Write a note on "Occupancy Certificate."

Q.3 Attempt any One 06

- a) Enlist and explain the in brief about "Types of Residential Building" with neat sketch.
- b) Explain the importance of AUTOCAD and describe any four commands of CAD.

Section – II

Q.4 Attempt any Two. 08

- a) What is "Green Building"? Explain in brief.
- b) Explain Concept and Design of Rain Water Harvesting.
- c) Write a note on "Low-cost Housing"
- d) Explain in brief "types of fire load."

Q.5 Attempt any One 06

- a) Explain reverberation and reverberation time using Sabine's formula.
- b) Enlist and explain in short materials available for "Sound Insulation."

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

CIVIL ENGINEERING

Structural Mechanics – II (BTN01403)

Day & Date: Sunday, 26-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary & mention it clearly before the solution.
4) Draw the appropriate sketches wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Multiple choice questions.

14

- 1) If load is acting away from the longitudinal axis of column, it is called _____.
a) Horizontal load b) Axial load
c) Eccentric load d) Vertical load
- 2) The co-efficient of wind resistance for circular chimney is _____.
a) 1 b) 2/3
c) 1/3 d) 1/4
- 3) The pressure intensity of water at free surface is _____.
a) Zero b) Maximum
c) Minimum d) Uniform
- 4) An electric pole is 6.5 m high from the ground level. Its effective length for design purpose will be _____.
a) 6.5 m b) 3.25 m
c) 13.0 m d) 12.0 m
- 5) Slenderness ratio is the ratio of effective length of column and _____.
a) lateral dimension of a column
b) least radius of gyration of a column
c) maximum radius of gyration of a column
d) none of the above
- 6) The ratio of crippling load, for a column of length (L) with both ends fixed to the crippling load of the same column with both ends hinges is equal to _____.
a) 2 b) 4
c) 0.25 d) 0.5
- 7) Deflection of a simply supported beam when subjected to central point load is given as _____.
a) $WL^3/16 EI$ b) $WL^2/16 EI$
c) $WL^3/48 EI$ d) $5WL^4/384 EI$

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Structural Mechanics – II (BTN01403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:**
- 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 - 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 - 3) Figures to the right indicate full marks.
 - 4) Assume suitable data if necessary & mention it clearly before the solution.
 - 5) Use of scientific non programmable calculator is allowed.
 - 6) Draw the appropriate sketches wherever necessary.

Section – I

- Q.2** A column is rectangular in cross section of 300 x 400 mm in dimensions. The column carries an eccentric point load of 360 kN on one diagonal at a distance of quarter diagonal length from a corner. Calculate the stresses at all four corners. **10**
- Q.3** A cantilever beam AB of length 2 m is carrying a point load 10 kN at B. as shown in fig.- 1. The moment of inertia for the right half of the cantilever is 10^8 mm^4 . Whereas the left half is $2 \times 10^8 \text{ mm}^4$. If $E = 2 \times 10^8 \text{ kN/m}^2$, find the slope and deflection at the free end of the cantilever. **09**

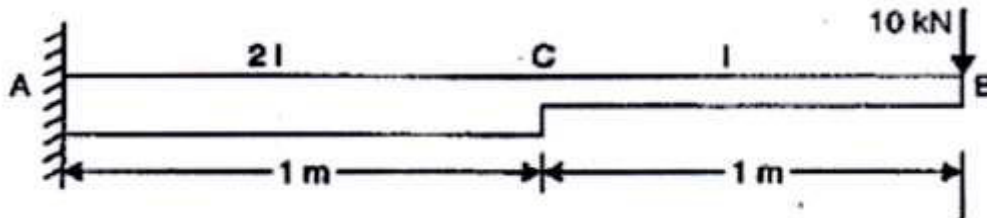


Fig.-1

- Q.4** A three hinged parabolic arch of span 40 m and rise 10 m carries a uniformly distributed load of 30 kN/m over left half span as shown in fig.-2. Find horizontal thrust and support reaction

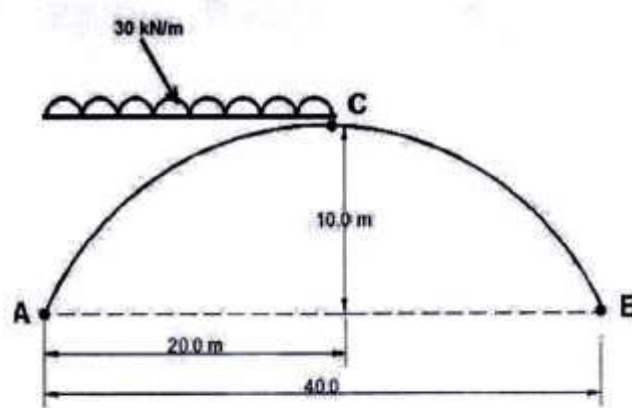


Fig.-2

- Q.5** Determine the crippling load for a T section of dimensions 10 cm x 10 cm x 2 cm as shown in fig.-3., and a length of 5 m when it is used as strut with both of its ends hinged. Take young's modulus, $E = 2.0 \times 10^5 \text{ N/mm}^2$.

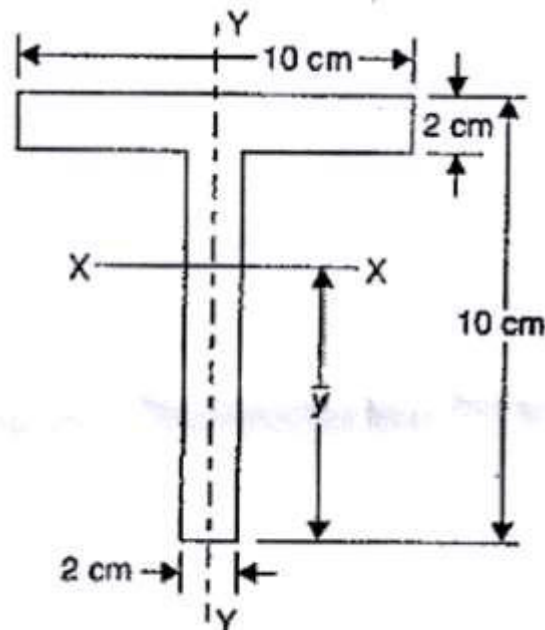


Fig.-3

Section – II

- Q.6** Analyze the continuous beam as shown in Fig.-4 and draw bending moment diagram.

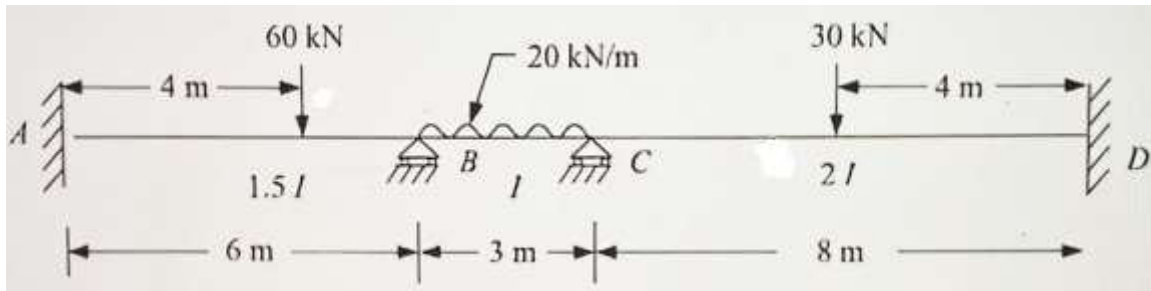
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Fig.-4

- Q.7** Analyze the continuous beam as shown in fig.-5 by flexibility matrix method

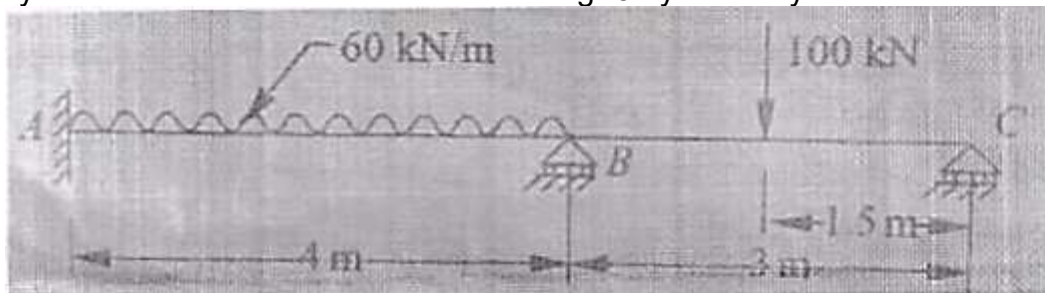
09

Fig.-5

- Q.8** Analysis the frame shown in Fig- 6 by stiffness matrix method

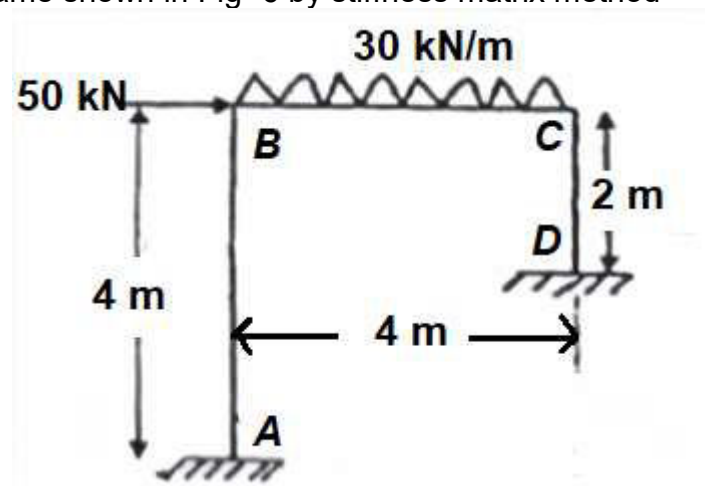
09

Fig.- 6

Q.9 Analysis the symmetric portal frame as shown in fig.-7 by moment distribution method and draw bending moment diagram

09

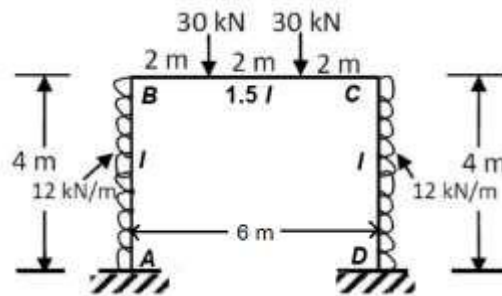


Fig.-7

**Seat
No.**

Max. Marks: 70

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Structural Mechanics – II (BTN01403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:**
- 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 - 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 - 3) Figures to the right indicate full marks.
 - 4) Assume suitable data if necessary & mention it clearly before the solution.
 - 5) Use of scientific non programmable calculator is allowed.
 - 6) Draw the appropriate sketches wherever necessary.

Section – I

- Q.2** A column is rectangular in cross section of 300 x 400 mm in dimensions. The column carries an eccentric point load of 360 kN on one diagonal at a distance of quarter diagonal length from a corner. Calculate the stresses at all four corners. **10**
- Q.3** A cantilever beam AB of length 2 m is carrying a point load 10 kN at B. as shown in fig.- 1. The moment of inertia for the right half of the cantilever is 10^8 mm^4 . Whereas the left half is $2 \times 10^8 \text{ mm}^4$. If $E = 2 \times 10^8 \text{ kN/m}^2$, find the slope and deflection at the free end of the cantilever. **09**

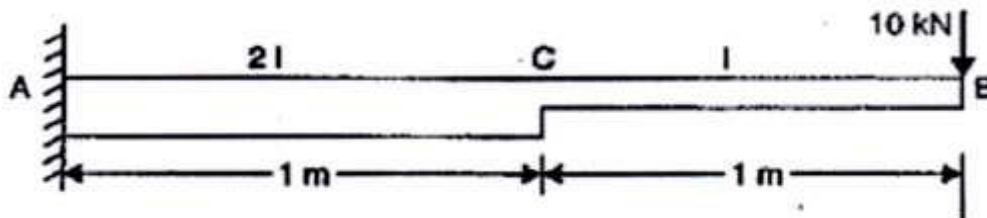


Fig.-1

- Q.4** A three hinged parabolic arch of span 40 m and rise 10 m carries a uniformly distributed load of 30 kN/m over left half span as shown in fig.-2. Find horizontal thrust and support reaction

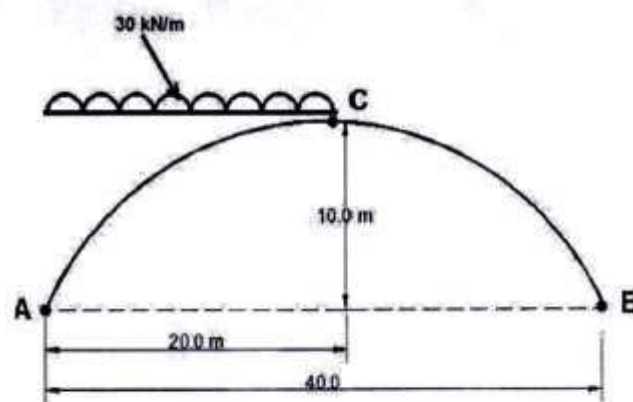


Fig.-2

- Q.5** Determine the crippling load for a T section of dimensions 10 cm x 10 cm x 2 cm as shown in fig.-3., and a length of 5 m when it is used as strut with both of its ends hinged. Take young's modulus, $E = 2.0 \times 10^5 \text{ N/mm}^2$.

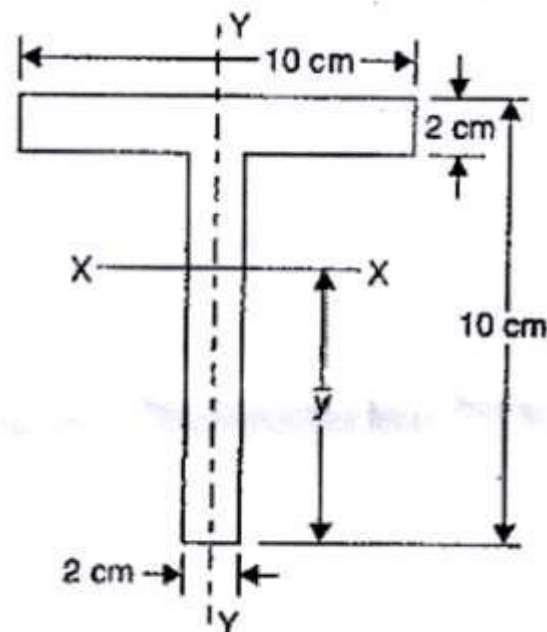


Fig.-3

Section – II

- Q.6** Analyze the continuous beam as shown in Fig.-4 and draw bending moment diagram.

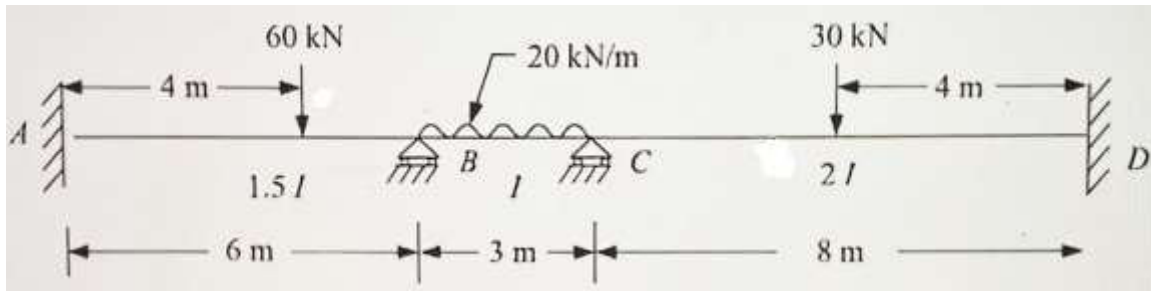
10

Fig.-4

- Q.7** Analyze the continuous beam as shown in fig.-5 by flexibility matrix method

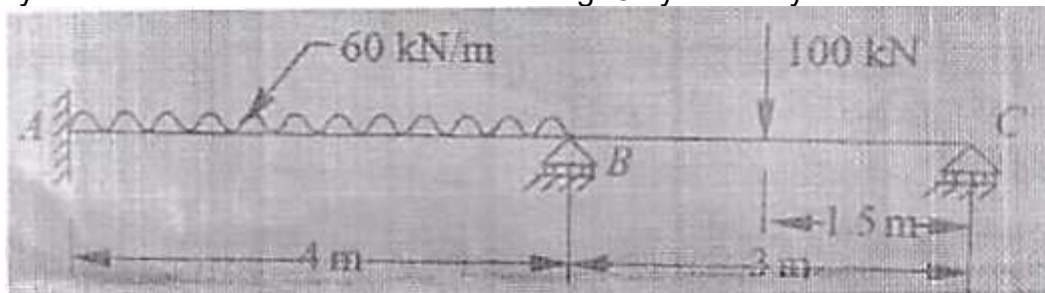
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Fig.-5

- Q.8** Analysis the frame shown in Fig- 6 by stiffness matrix method

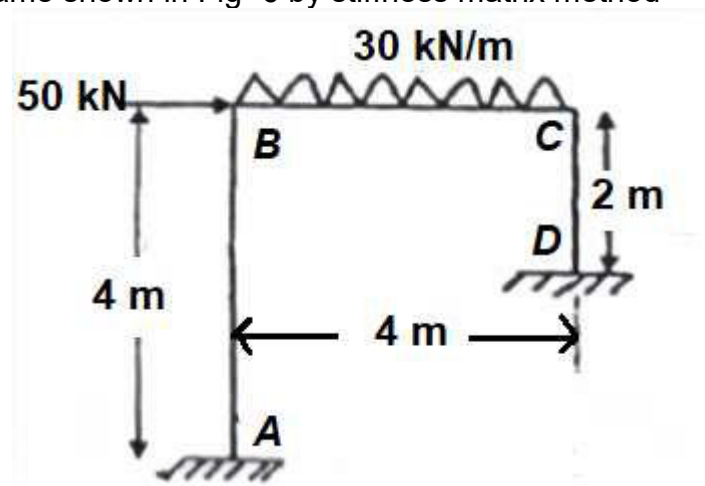
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Fig.- 6

Q.9 Analysis the symmetric portal frame as shown in fig.-7 by moment distribution method and draw bending moment diagram

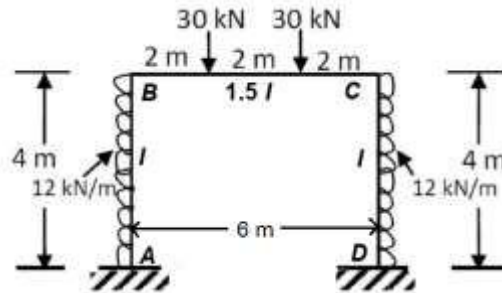


Fig.-7

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Structural Mechanics – II (BTN01403)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Figures to the right indicates full marks.
- 3) Assume suitable data if necessary & mention it clearly before the solution.
- 4) Draw the appropriate sketches wherever necessary.

Marks: 14

14

- 1) For stable structures, one of the important properties of flexibility and stiffness matrices is that the elements on the main diagonal _____.
 - i) of a stiffness matrix must be positive
 - ii) of a stiffness matrix must be negative
 - iii) of a flexibility matrix must be positive
 - iv) of a flexibility matrix must be negativeThe correct answer is
 - a) (i) and (iii)
 - b) (ii) and (iii)
 - c) (i) and (iv)
 - d) (ii) and (iv)
- 2) The number of independent equations to be satisfied for static equilibrium of a plane structure is _____.
 - a) 2
 - b) 6
 - c) 3
 - d) None of these
- 3) Flexibility matrix is also known as _____.
 - a) Displacement method
 - b) Stiffness method
 - c) Equilibrium method
 - d) Compatibility method
- 4) Independent displacement components at each joint of a rigid-jointed plane frame are _____.
 - a) Three linear movements
 - b) Two linear movements and one rotation
 - c) One linear movement and two rotations
 - d) Three rotations
- 5) If load is acting away from the longitudinal axis of column, it is called _____.
 - a) Horizontal load
 - b) Axial load
 - c) Eccentric load
 - d) Vertical load
- 6) The co-efficient of wind resistance for circular chimney is _____.
 - a) 1
 - b) 2/3
 - c) 1/3
 - d) 1/4

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Structural Mechanics – II (BTN01403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:**
- 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 - 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
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 - 4) Assume suitable data if necessary & mention it clearly before the solution.
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Section – I

- Q.2** A column is rectangular in cross section of 300 x 400 mm in dimensions. The column carries an eccentric point load of 360 kN on one diagonal at a distance of quarter diagonal length from a corner. Calculate the stresses at all four corners. **10**
- Q.3** A cantilever beam AB of length 2 m is carrying a point load 10 kN at B. as shown in fig.- 1. The moment of inertia for the right half of the cantilever is 10^8 mm^4 . Whereas the left half is $2 \times 10^8 \text{ mm}^4$. If $E = 2 \times 10^8 \text{ kN/m}^2$, find the slope and deflection at the free end of the cantilever. **09**

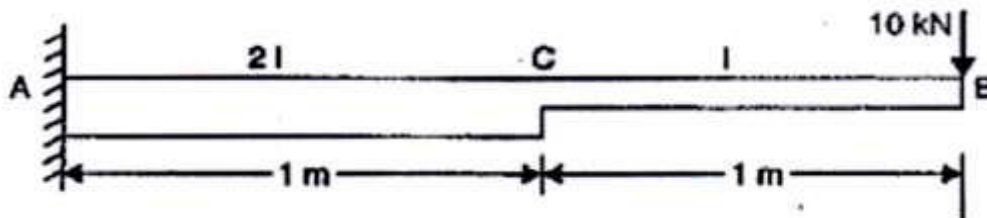


Fig.-1

- Q.4** A three hinged parabolic arch of span 40 m and rise 10 m carries a uniformly distributed load of 30 kN/m over left half span as shown in fig.-2. Find horizontal thrust and support reaction

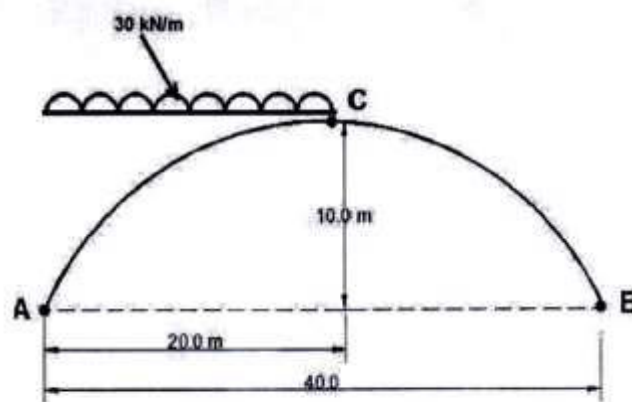


Fig.-2

- Q.5** Determine the crippling load for a T section of dimensions 10 cm x 10 cm x 2 cm as shown in fig.-3., and a length of 5 m when it is used as strut with both of its ends hinged. Take young's modulus, $E = 2.0 \times 10^5 \text{ N/mm}^2$.

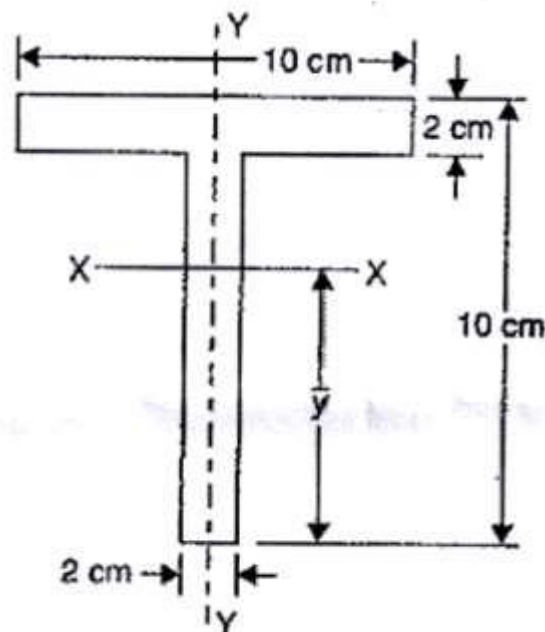


Fig.-3

Section – II

- Q.6** Analyze the continuous beam as shown in Fig.-4 and draw bending moment diagram.

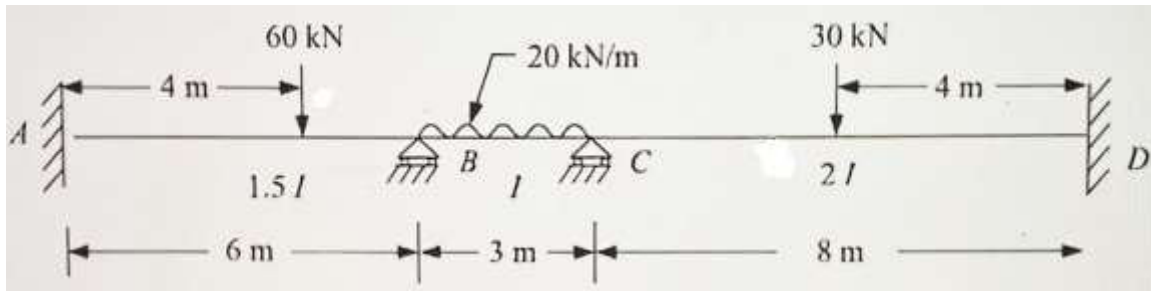
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Fig.-4

- Q.7** Analyze the continuous beam as shown in fig.-5 by flexibility matrix method

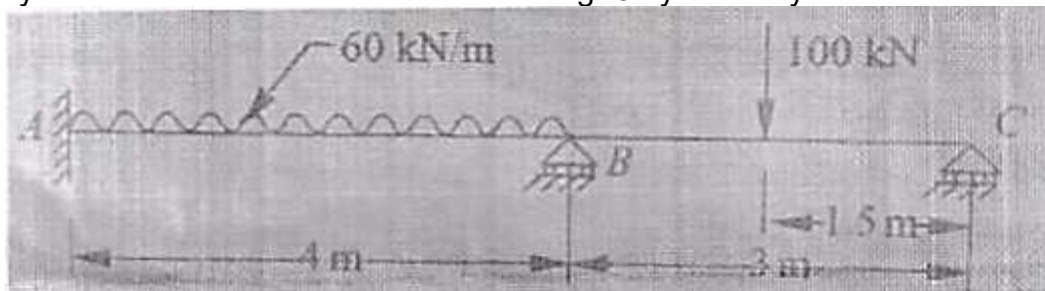
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Fig.-5

- Q.8** Analysis the frame shown in Fig- 6 by stiffness matrix method

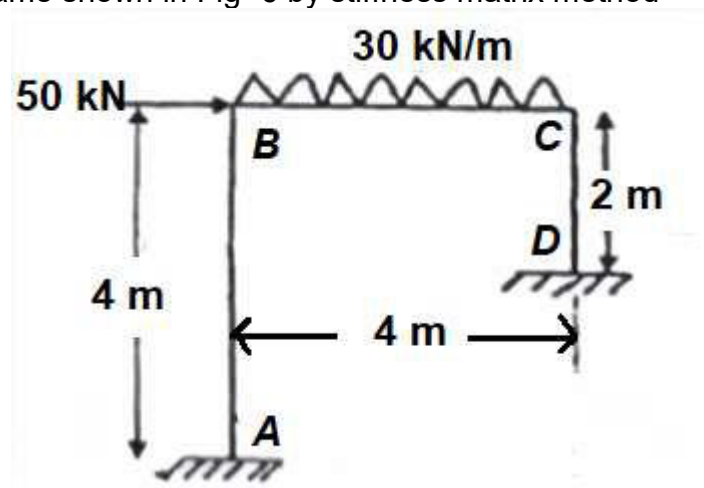
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Fig.- 6

Q.9 Analysis the symmetric portal frame as shown in fig.-7 by moment distribution method and draw bending moment diagram

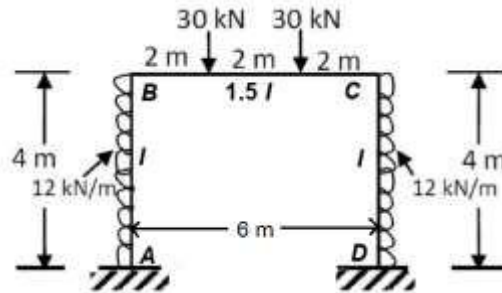
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Fig.-7

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Structural Mechanics – II (BTN01403)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Figures to the right indicates full marks.
- 3) Assume suitable data if necessary & mention it clearly before the solution.
- 4) Draw the appropriate sketches wherever necessary.

Marks: 14

14

- 1) The ratio of crippling load, for a column of length (L) with both ends fixed to the crippling load of the same column with both ends hinges is equal to _____.
a) 2 b) 4
c) 0.25 d) 0.5
- 2) Deflection of a simply supported beam when subjected to central point load is given as _____.
a) $\frac{WL^3}{16 EI}$ b) $\frac{WL^2}{16 EI}$
c) $\frac{WL^3}{48 EI}$ d) $\frac{5WL^4}{384 EI}$
- 3) A three hinged parabolic arch has a span of 30 m and the central rise is 5 m. It is subjected to a point load of 40 kN at a distance of 20 m from the right hinge. Calculate the vertical component at its left support
a) 35.35 kN b) 40 kN
c) 13.13 kN d) 26.67 kN
- 4) The carryover factor in a prismatic member whose far end is fixed is _____.
a) Zero b) $\frac{1}{2}$
c) $\frac{3}{4}$ d) One
- 5) Carryover Moment at end B due to moment M applied at end A for the given beam is _____.



- a) Zero
b) $+M$
c) $-M$
d) $+(M/2)$

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Structural Mechanics – II (BTN01403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:**
- 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 - 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 - 3) Figures to the right indicate full marks.
 - 4) Assume suitable data if necessary & mention it clearly before the solution.
 - 5) Use of scientific non programmable calculator is allowed.
 - 6) Draw the appropriate sketches wherever necessary.

Section – I

- Q.2** A column is rectangular in cross section of 300 x 400 mm in dimensions. The column carries an eccentric point load of 360 kN on one diagonal at a distance of quarter diagonal length from a corner. Calculate the stresses at all four corners. **10**
- Q.3** A cantilever beam AB of length 2 m is carrying a point load 10 kN at B. as shown in fig.- 1. The moment of inertia for the right half of the cantilever is 10^8 mm^4 . Whereas the left half is $2 \times 10^8 \text{ mm}^4$. If $E = 2 \times 10^8 \text{ kN/m}^2$, find the slope and deflection at the free end of the cantilever. **09**

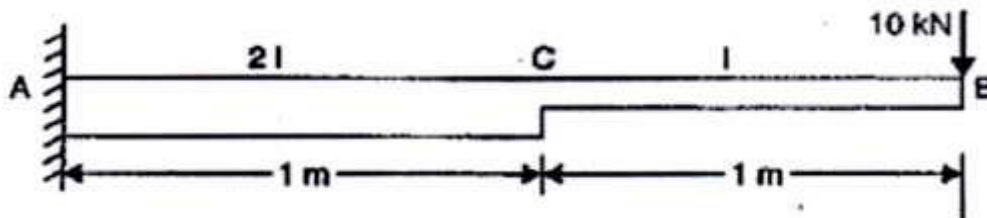


Fig.-1

- Q.4** A three hinged parabolic arch of span 40 m and rise 10 m carries a uniformly distributed load of 30 kN/m over left half span as shown in fig.-2. Find horizontal thrust and support reaction

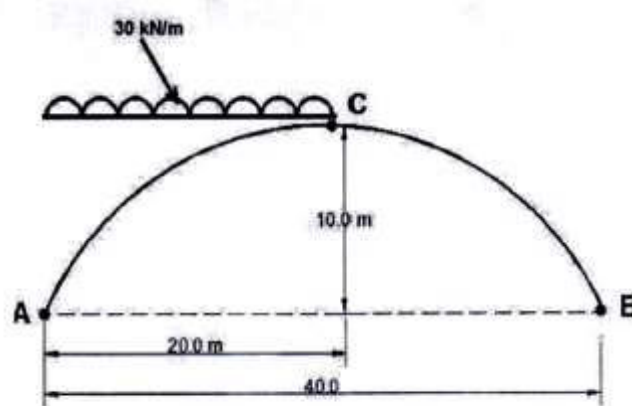


Fig.-2

- Q.5** Determine the crippling load for a T section of dimensions 10 cm x 10 cm x 2 cm as shown in fig.-3., and a length of 5 m when it is used as strut with both of its ends hinged. Take young's modulus, $E = 2.0 \times 10^5 \text{ N/mm}^2$.

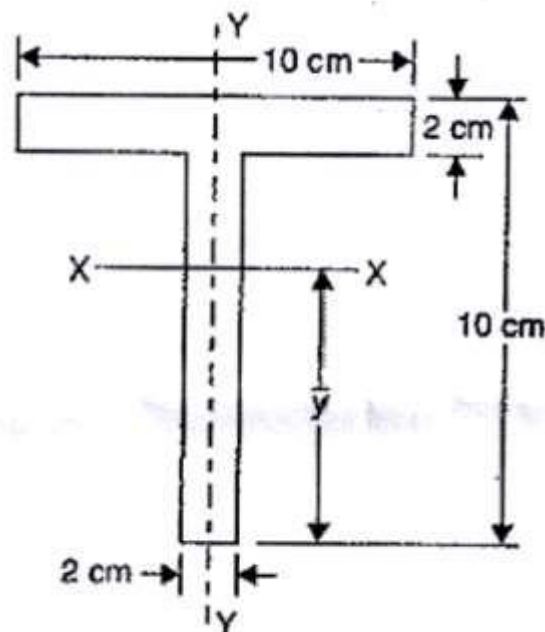


Fig.-3

Section – II

- Q.6** Analyze the continuous beam as shown in Fig.-4 and draw bending moment diagram.

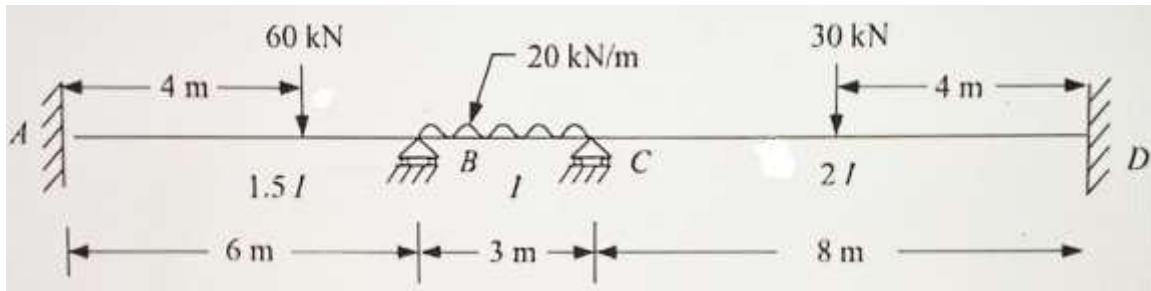
10

Fig.-4

- Q.7** Analyze the continuous beam as shown in fig.-5 by flexibility matrix method

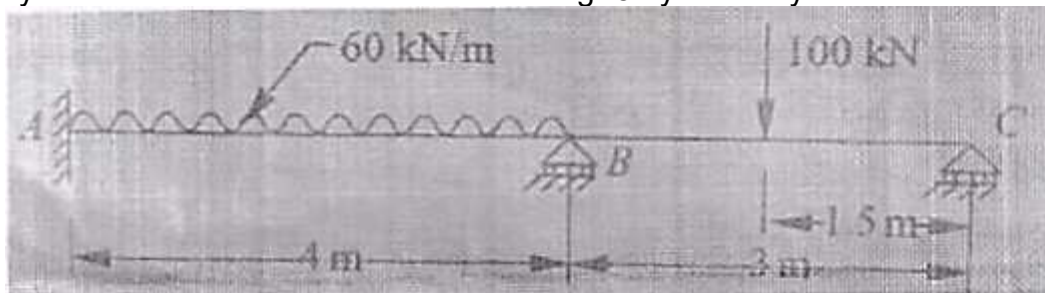
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Fig.-5

- Q.8** Analysis the frame shown in Fig- 6 by stiffness matrix method

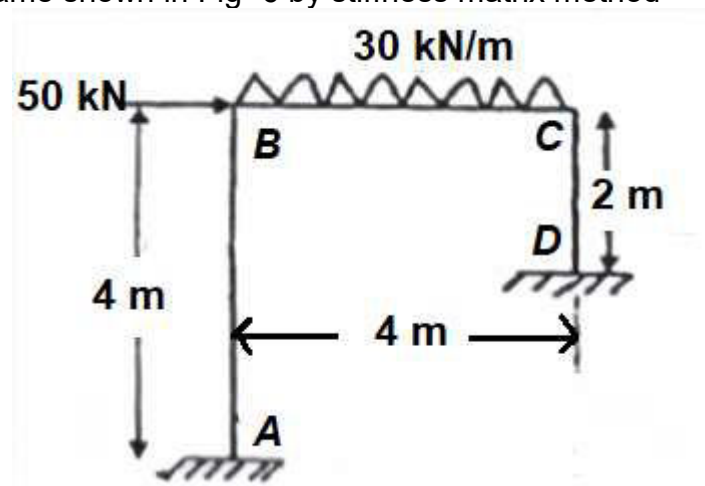
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Fig.- 6

Q.9 Analysis the symmetric portal frame as shown in fig.-7 by moment distribution method and draw bending moment diagram

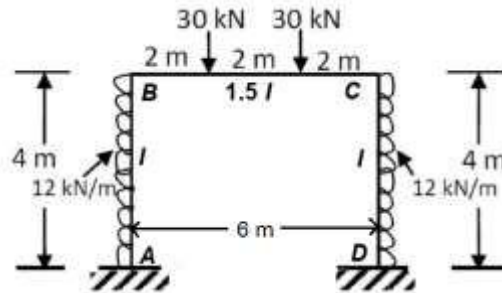
09

Fig.-7

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Engineering Geology (BTN01405)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Draw neat and labeled diagram wherever necessary.

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1 of 12**

- 9) Landslides are common in _____ regions.
 - a) plain
 - b) basins
 - c) mountainous
 - d) marine
- 10) Which of the following rock is highly porous and undesirable below reservoir?
 - a) slate
 - b) vesicular basalt
 - c) granite
 - d) quartzite
- 11) Intensity of earthquake waves is recorded by an instrument is called _____.
 - a) Seismoscope
 - b) Seismogram
 - c) Seismograph
 - d) Seismometer
- 12) The resistance offered by building stones to weathering action is called _____.
 - a) compressive strength
 - b) tensile strength
 - c) durability
 - d) bulk density
- 13) Most efficient, reliable and cheap method to understand sub-surface geology is _____.
 - a) seismic method
 - b) gravity method
 - c) magnetic method
 - d) electric resistivity method
- 14) Which of the following dam can be constructed on weak foundation rocks but strong Abutments?
 - a) Earthen dam
 - b) Arch dam
 - c) Gravity dam
 - d) None of these

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Engineering Geology (BTN01405)

Day & Date: Tuesday, 28-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
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Section – I

- Q.2** **a)** Define Joints. Explain any two types of Joints. **06**
 b) What are igneous rocks? Classify them on the basis of mode of occurrence. **06**

OR

- Q.3** **a)** Define Metamorphic rocks. Describe Schistose and Granulose structures **06**
 b) Describe physical properties and chemical properties of Muscovite and Biotite minerals. **06**

- Q.4** Define Volcano. Describe Central and Fissure types of Volcanoes. **07**

OR

- Q.5** Define Fault. Describe Normal and Reverse Faults. **07**

- Q.6** **Write a note on (Any Three)** **09**

- a)** Vesicular structure
b) Anticline fold
c) Thermal metamorphism
d) Types of luster in minerals
e) Strike & Dip

Section – II

- Q.7** **a)** Define Siltation. Describe different causes of siltation process. **06**
 b) Define Landslides. Explain any two preventive measures of Landslides. **06**

OR

- Q.8** **a)** Define Earthquake. Describe Primary and Secondary seismic waves. **06**
 b) Define Building stones. Explain Porosity and crushing strength of building stones. **06**

- Q.9** Define Dam. Describe any three types of Dams with reference to geological conditions. **07**

OR

- Q.10** Define Aquifer. Add a note on Types of aquifers **07**

- Q.11** **Write a note on (Any Three)** **09**

- a)** Rain water harvesting
b) Dams on inclined beds
c) Rock Quality Designation
d) Focus and Epicenter
e) Importance of Geology in Civil Engineering

Seat No.	
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Engineering Geology (BTN01405)

Max. Marks: 70

MCQ/Objective Type Questions

Marks:14

14

- Sloping surface of valley upon which dam rests is known as _____.
a) toe
b) heel
c) abutment
d) pier
- Landslides are common in _____ regions.
a) plain
b) basins
c) mountainous
d) marine
- Which of the following rock is highly porous and undesirable below reservoir?
a) slate
b) vesicular basalt
c) granite
d) quartzite
- Intensity of earthquake waves is recorded by an instrument is called _____.
a) Seismoscope
b) Seismogram
c) Seismograph
d) Seismometer
- The resistance offered by building stones to weathering action is called _____.
a) compressive strength
b) tensile strength
c) durability
d) bulk density
- Most efficient, reliable and cheap method to understand sub-surface geology is _____.
a) seismic method
b) gravity method
c) magnetic method
d) electric resistivity method
- Which of the following dam can be constructed on weak foundation rocks but strong Abutments?
a) Earthen dam
b) Arch dam
c) Gravity dam
d) None of these
- Metamorphic rock with granulostructure and Calcium carbonate is a _____.
a) Marble
b) Gneiss
c) Slate
d) Phyllite

- 9) The average thickness of Mantle of the earth is _____ km.
 - a) 20
 - b) 40
 - c) 2900
 - d) 6763
- 10) Which one of the following is a part of fold?
 - a) crater
 - b) geyser
 - c) volcanic cinder
 - d) limb
- 11) A coarse-grained sedimentary rock with rounded pebbles, cobbles is called as _____.
 - a) breccia
 - b) sandstone
 - c) conglomerate
 - d) basalt
- 12) Which of the following fold represent horizontal axial plane?
 - a) asymmetrical
 - b) symmetrical
 - c) overturned
 - d) recumbent
- 13) Which of the following mineral has Hardness 9?
 - a) Corundum
 - b) Talc
 - c) Diamond
 - d) Topaz
- 14) In _____ weathering, breaking of the rocks fragments takes place by natural agents with change in their composition.
 - a) Chemical
 - b) Mechanical
 - c) Biological
 - d) Hydrolysis

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Engineering Geology (BTN01405)

Max. Marks: 70

MCQ/Objective Type Questions

Marks:14

14

- 1) Intensity of earthquake waves is recorded by an instrument is called ____.

a) Seismoscope b) Seismogram

c) Seismograph d) Seismometer
- 2) The resistance offered by building stones to weathering action is called ____

a) compressive strength b) tensile strength

c) durability d) bulk density
- 3) Most efficient, reliable and cheap method to understand sub-surface geology is _____

a) seismic method b) gravity method

c) magnetic method d) electric resistivity method
- 4) Which of the following dam can be constructed on weak foundation rocks but strong Abutments?

a) Earthen dam b) Arch dam

c) Gravity dam d) None of these
- 5) Metamorphic rock with granulose structure and Calcium carbonate is a ____

a) Marble b) Gneiss

c) Slate d) Phyllite
- 6) The average thickness of Mantle of the earth is _____ km.

a) 20 b) 40

c) 2900 d) 6763
- 7) Which one of the following is a part of fold?

a) crater b) geyser

c) volcanic cinder d) limb
- 8) A coarse-grained sedimentary rock with rounded pebbles, cobbles is called as _____

a) breccia b) sandstone

c) conglomerate d) basalt

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
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- Q.9** Define Dam. Describe any three types of Dams with reference to geological conditions. **07**

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- Q.11** **Write a note on (Any Three)** **09**
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Engineering Geology (BTN01405)

Max. Marks: 70

MCQ/Objective Type Questions

Marks:14

14

- 10 of 12

- 9) Which of the following dam can be constructed on weak foundation rocks but strong Abutments?
- a) Earthen dam
 - b) Arch dam
 - c) Gravity dam
 - d) None of these
- 10) Metamorphic rock with granulose structure and Calcium carbonate is a ____
- a) Marble
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- 11) The average thickness of Mantle of the earth is ____ km.
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- 12) Which one of the following is a part of fold?
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 - c) volcanic cinder
 - d) limb
- 13) A coarse-grained sedimentary rock with rounded pebbles, cobbles is called as ____
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 - b) sandstone
 - c) conglomerate
 - d) basalt
- 14) Which of the following fold represent horizontal axial plane?
- a) asymmetrical
 - b) symmetrical
 - c) overturned
 - d) recumbent

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Engineering Geology (BTN01405)

Day & Date: Tuesday, 28-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2** **a)** Define Joints. Explain any two types of Joints. **06**
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- Q.4** Define Volcano. Describe Central and Fissure types of Volcanoes. **07**

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- Q.6** **Write a note on (Any Three)** **09**

- a)** Vesicular structure
b) Anticline fold
c) Thermal metamorphism
d) Types of luster in minerals
e) Strike & Dip

Section – II

- Q.7** **a)** Define Siltation. Describe different causes of siltation process. **06**
 b) Define Landslides. Explain any two preventive measures of Landslides. **06**

OR

- Q.8** **a)** Define Earthquake. Describe Primary and Secondary seismic waves. **06**
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- Q.9** Define Dam. Describe any three types of Dams with reference to geological conditions. **07**

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- Q.11** **Write a note on (Any Three)** **09**

- a)** Rain water harvesting
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Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Engineering Mathematics – III (BTN01404)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The Particular integral of $(D^3 - D^2)y = x$ is _____.
 - a) $\frac{x^3}{6} + \frac{x^2}{2}$
 - b) $\frac{-x^3}{6} + \frac{x^2}{2}$
 - c) $\frac{-x^3}{6} - \frac{x^2}{2}$
 - d) $\frac{x^4}{24} - \frac{x^3}{6}$
- 2) In the interval (0,2) the constant term in the Fourier series of $f(x) = x$ is _____.
 - a) 0
 - b) π
 - c) 1
 - d) 2
- 3) $L[e^t t^3]$ is _____.
 - a) $\frac{6}{(s-1)^4}$
 - b) $\frac{6}{s(s-1)^4}$
 - c) $\frac{1}{(s-1)^4}$
 - d) $\frac{1}{s(s-1)^4}$
- 4) In a Poisson's distribution such that $P(x = 2) = P(x = 3)$ then the mean of distribution is _____.
 - a) 2
 - b) 3
 - c) $2/3$
 - d) $3/2$
- 5) $L^{-1} \left[\frac{(s^2-1)^2}{s^5} \right]$ is _____.
 - a) $1 - t^2 + \frac{t^4}{24}$
 - b) $1 - t^2 + \frac{t^3}{24}$
 - c) $-1 - t^2 + \frac{t^4}{24}$
 - d) $-1 + t^2 + \frac{t^4}{24}$
- 6) The value of correlation coefficient r lies between _____.
 - a) -1 and 1
 - b) $-\infty$ and ∞
 - c) 0 and ∞
 - d) None of these
- 7) For binomial distribution the mean is 2 and standard deviation is 1. Hence the value of n is equal to _____.
 - a) 2
 - b) 4
 - c) 3
 - d) 1

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Engineering Mathematics – III (BTN01404)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any Three of the following.**09**

- Solve $(D^4 - 16)y = \sin 2x$
- Solve $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = x^2$
- Solve $p^2 - q^2 = x - y$
- Solve $q = z^2 p(1 - p^2)$
- Obtain half range cosines series for $f(x) = x$ in $0 < x < 2$.

Q.3 Solve any Three of the following.**09**

- Solve $(x + 2)^2 \frac{d^2 y}{dx^2} + 2(x + 2) \frac{dy}{dx} - 3y = x^2$
- Obtain the Fourier expansion of $f(x) = 9 - x^2$ in the interval $(-3, 3)$.
- Solve $p x^2 + q y^2 = z^2$
- Solve $(D^2 + 4D + 4)y = e^{-2x} \cos 2x$
- Obtain Fourier series of $f(x) = x$ in $(-\pi, \pi)$.

Q.4 Solve any Two of the following.**10**

- $(D^2 + a^2)y = \sec ax$
- Obtain the Fourier expansion of $f(x) = |x|$ in $(-\pi, \pi)$ deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots$$
- Use variable separable method to solve $\frac{\partial z}{\partial x} + 4 \frac{\partial z}{\partial y} = 0$, given $z(0, y) = 8 e^{-3y}$

Section – II

Q.5 Solve any Three of the following.**09**

- Find $L\{e^{2t}(\sin 2t + \cos 2t)^2\}$
- Find the inverse Laplace transform of following by using the Convolution theorem of $\left[\frac{1}{(s)(s^2+9)}\right]$
- Fit a first degree curve to the following data

x	1	2	3	4	5
y	14	27	40	55	68

- d) Fit a second degree parabola to following data:

x	1	2	3	4	5
y	1250	1400	1650	1950	2300

- e) Find coefficient of the following data

x	28	45	40	38	35	33	40	32	36	33
y	23	34	33	34	30	26	28	31	36	35

Q.6 Solve any Three of the following.

09

- a) Evaluate $\int_0^{\infty} \frac{e^{-t} - e^{-3t}}{t} dt$ by using laplace transform.
- b) Find the inverse Laplace transform of $\left[\frac{s+29}{(s+4)(s^2+9)} \right]$.
- c) In a large assignment of electric bulbs, 10% are defective. A random sample of 20 is taken for inspection. Using Binomial distribution, find the probability that:
- All are good bulbs
 - Exactly three are defective bulbs.
- d) Fit a poison distribution for following data:

x	0	1	2	3	4
f	109	65	22	3	1

- e) For the following data fit a curve of the form $y = ax^b$

x	1	2	3	4	5	6
y	12	9	6	2	11	5

Q.7 Solve any Two of the following.

10

- a) Use Laplace transform to solve $\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 20 \sin 2t$, where $y(0) = 1$; $y'(0) = 2$.
- b) The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Estimate the number of students whose marks will be:
- Between 60 & 75
 - More than 75
- (For SNV, z area under the curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- c) Find the equation of lines of regression and also coefficient of correlation from the following:

x:	57	42	38	42	45	44	40	46	44	43	40
y:	10	26	41	29	27	19	18	19	31	29	33

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
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Engineering Mathematics – III (BTN01404)

Day & Date: Thursday, 30-05-2024

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) Fourier series of $f(x) = x$ in $(-\pi, \pi)$ will contain _____.
 - a) No sine term
 - b) No cosine term
 - c) Both cosine and sine term
 - d) None of these
- 2) The equations of lines of regression $x + 2y = 5$, $2x + 3y = 8$, the mean of x & y are respectively, _____.
 - a) 2 & 3
 - b) 1 & 3
 - c) 1 & 2
 - d) 2 & 5
- 3) The solution of $(D^2 - 4)y = 0$ is _____.
 - a) $C_1 e^{2x} + C_2 e^{-2x}$
 - b) 0
 - c) $(C_1 x + C_2) e^{-2x}$
 - d) $C_1 e^{2x} + C_2 e^{-2x} + (C_3 \cos 2x + C_4 \sin 2x)$
- 4) The solution of a partial differential equation $q = e^{-p}$ is _____.
 - a) $z = ax + by + c$
 - b) $z = ax + e^{-a}y + c$
 - c) $z = ax + e^a y + c$
 - d) $z = ax + y^{-b} + c$
- 5) The solution of a partial differential equation $p + q = z$ is _____.
 - a) $f(xy, y \log z) = 0$
 - b) $f(x + y, y + \log z) = 0$
 - c) $f(x - y, y - \log z) = 0$
 - d) $f(x + y, y - \log z) = 0$
- 6) The solution of a partial differential equation $x p + y q = z$ is _____.
 - a) $f(x^2, y^2) = 0$
 - b) $f(x, y) = 0$
 - c) $f(xz, yz) = 0$
 - d) $f\left(\frac{x}{y}, \frac{y}{z}\right) = 0$
- 7) The condition for expansion of function in Fourier series are known as _____.
 - a) Harmonic
 - b) Riemann
 - c) Periodic
 - d) Dirichlets

- 8) The Particular integral of $(D^3 - D^2)y = x$ is _____.
 a) $\frac{x^3}{6} + \frac{x^2}{2}$ b) $\frac{-x^3}{6} + \frac{x^2}{2}$
 c) $\frac{-x^3}{6} - \frac{x^2}{2}$ d) $\frac{x^4}{24} - \frac{x^3}{6}$
- 9) In the interval (0,2) the constant term in the Fourier series of $f(x) = x$ is _____.
 a) 0 b) π
 c) 1 d) 2
- 10) $L[e^t t^3]$ is _____.
 a) $\frac{6}{(s-1)^4}$ b) $\frac{6}{s(s-1)^4}$
 c) $\frac{1}{(s-1)^4}$ d) $\frac{1}{s(s-1)^4}$
- 11) In a Poisson's distribution such that $P(x = 2) = P(x = 3)$ then the mean of distribution is _____.
 a) 2 b) 3
 c) $2/3$ d) $3/2$
- 12) $L^{-1} \left[\frac{(s^2-1)^2}{s^5} \right]$ is _____.
 a) $1 - t^2 + \frac{t^4}{24}$ b) $1 - t^2 + \frac{t^3}{24}$
 c) $-1 - t^2 + \frac{t^4}{24}$ d) $-1 + t^2 + \frac{t^4}{24}$
- 13) The value of correlation coefficient r lies between _____.
 a) -1 and 1 b) $-\infty$ and ∞
 c) 0 and ∞ d) None of these
- 14) For binomial distribution the mean is 2 and standard deviation is 1. Hence the value of n is equal to _____.
 a) 2 b) 4
 c) 3 d) 1

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Engineering Mathematics – III (BTN01404)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Solve any Three of the following.

09

- Solve $(D^4 - 16)y = \sin 2x$
- Solve $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = x^2$
- Solve $p^2 - q^2 = x - y$
- Solve $q = z^2 p(1 - p^2)$
- Obtain half range cosines series for $f(x) = x$ in $0 < x < 2$.

Q.3 Solve any Three of the following.

09

- Solve $(x + 2)^2 \frac{d^2 y}{dx^2} + 2(x + 2) \frac{dy}{dx} - 3y = x^2$
- Obtain the Fourier expansion of $f(x) = 9 - x^2$ in the interval $(-3, 3)$.
- Solve $p x^2 + q y^2 = z^2$
- Solve $(D^2 + 4D + 4)y = e^{-2x} \cos 2x$
- Obtain Fourier series of $f(x) = x$ in $(-\pi, \pi)$.

Q.4 Solve any Two of the following.

10

- $(D^2 + a^2)y = \sec ax$
- Obtain the Fourier expansion of $f(x) = |x|$ in $(-\pi, \pi)$ deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots$$
- Use variable separable method to solve $\frac{\partial z}{\partial x} + 4 \frac{\partial z}{\partial y} = 0$, given $z(0, y) = 8 e^{-3y}$

Section – II

Q.5 Solve any Three of the following.

09

- Find $L\{e^{2t}(\sin 2t + \cos 2t)^2\}$
- Find the inverse Laplace transform of following by using the Convolution theorem of $\left[\frac{1}{(s)(s^2+9)}\right]$
- Fit a first degree curve to the following data

x	1	2	3	4	5
y	14	27	40	55	68

- d) Fit a second degree parabola to following data:

x	1	2	3	4	5
y	1250	1400	1650	1950	2300

- e) Find coefficient of the following data

x	28	45	40	38	35	33	40	32	36	33
y	23	34	33	34	30	26	28	31	36	35

Q.6 Solve any Three of the following.

09

- a) Evaluate $\int_0^{\infty} \frac{e^{-t} - e^{-3t}}{t} dt$ by using laplace transform.
- b) Find the inverse Laplace transform of $\left[\frac{s+29}{(s+4)(s^2+9)} \right]$.
- c) In a large assignment of electric bulbs, 10% are defective. A random sample of 20 is taken for inspection. Using Binomial distribution, find the probability that:
- All are good bulbs
 - Exactly three are defective bulbs.
- d) Fit a poison distribution for following data:

x	0	1	2	3	4
f	109	65	22	3	1

- e) For the following data fit a curve of the form $y = ax^b$

x	1	2	3	4	5	6
y	12	9	6	2	11	5

Q.7 Solve any Two of the following.

10

- a) Use Laplace transform to solve $\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 20 \sin 2t$, where $y(0) = 1$; $y'(0) = 2$.
- b) The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Estimate the number of students whose marks will be:
- Between 60 & 75
 - More than 75
- (For SNV, z area under the curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- c) Find the equation of lines of regression and also coefficient of correlation from the following:

x:	57	42	38	42	45	44	40	46	44	43	40
y:	10	26	41	29	27	19	18	19	31	29	33

Seat No.	
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Engineering Mathematics – III (BTN01404)

Max. Marks: 70

MCQ/Objective Type Questions

Marks:14

14

- Page 9 of 16

- Page 10 of 16

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Engineering Mathematics – III (BTN01404)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any Three of the following.

09

- Solve $(D^4 - 16)y = \sin 2x$
- Solve $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = x^2$
- Solve $p^2 - q^2 = x - y$
- Solve $q = z^2 p(1 - p^2)$
- Obtain half range cosines series for $f(x) = x$ in $0 < x < 2$.

Q.3 Solve any Three of the following.

09

- Solve $(x + 2)^2 \frac{d^2 y}{dx^2} + 2(x + 2) \frac{dy}{dx} - 3y = x^2$
- Obtain the Fourier expansion of $f(x) = 9 - x^2$ in the interval $(-3, 3)$.
- Solve $p x^2 + q y^2 = z^2$
- Solve $(D^2 + 4D + 4)y = e^{-2x} \cos 2x$
- Obtain Fourier series of $f(x) = x$ in $(-\pi, \pi)$.

Q.4 Solve any Two of the following.

10

- $(D^2 + a^2)y = \sec ax$
- Obtain the Fourier expansion of $f(x) = |x|$ in $(-\pi, \pi)$ deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots$$
- Use variable separable method to solve $\frac{\partial z}{\partial x} + 4 \frac{\partial z}{\partial y} = 0$, given $z(0, y) = 8 e^{-3y}$

Section – II

Q.5 Solve any Three of the following.

09

- Find $L\{e^{2t}(\sin 2t + \cos 2t)^2\}$
- Find the inverse Laplace transform of following by using the Convolution theorem of $\left[\frac{1}{(s)(s^2+9)}\right]$
- Fit a first degree curve to the following data

x	1	2	3	4	5
y	14	27	40	55	68

- d) Fit a second degree parabola to following data:

x	1	2	3	4	5
y	1250	1400	1650	1950	2300

- e) Find coefficient of the following data

x	28	45	40	38	35	33	40	32	36	33
y	23	34	33	34	30	26	28	31	36	35

Q.6 Solve any Three of the following.

09

- a) Evaluate $\int_0^{\infty} \frac{e^{-t} - e^{-3t}}{t} dt$ by using laplace transform.
- b) Find the inverse Laplace transform of $\left[\frac{s+29}{(s+4)(s^2+9)} \right]$.
- c) In a large assignment of electric bulbs, 10% are defective. A random sample of 20 is taken for inspection. Using Binomial distribution, find the probability that:
- All are good bulbs
 - Exactly three are defective bulbs.
- d) Fit a poison distribution for following data:

x	0	1	2	3	4
f	109	65	22	3	1

- e) For the following data fit a curve of the form $y = ax^b$

x	1	2	3	4	5	6
y	12	9	6	2	11	5

Q.7 Solve any Two of the following.

10

- a) Use Laplace transform to solve $\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 20 \sin 2t$, where $y(0) = 1$; $y'(0) = 2$.
- b) The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Estimate the number of students whose marks will be:
- Between 60 & 75
 - More than 75
- (For SNV, z area under the curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- c) Find the equation of lines of regression and also coefficient of correlation from the following:

x:	57	42	38	42	45	44	40	46	44	43	40
y:	10	26	41	29	27	19	18	19	31	29	33

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Max. Marks: 70

MCQ/Objective Type Questions

Marks:14

14

- Page 13 of 16

- Page 14 of 16

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Engineering Mathematics – III (BTN01404)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any Three of the following.

09

- Solve $(D^4 - 16)y = \sin 2x$
- Solve $x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + y = x^2$
- Solve $p^2 - q^2 = x - y$
- Solve $q = z^2 p(1 - p^2)$
- Obtain half range cosines series for $f(x) = x$ in $0 < x < 2$.

Q.3 Solve any Three of the following.

09

- Solve $(x + 2)^2 \frac{d^2 y}{dx^2} + 2(x + 2) \frac{dy}{dx} - 3y = x^2$
- Obtain the Fourier expansion of $f(x) = 9 - x^2$ in the interval $(-3, 3)$.
- Solve $p x^2 + q y^2 = z^2$
- Solve $(D^2 + 4D + 4)y = e^{-2x} \cos 2x$
- Obtain Fourier series of $f(x) = x$ in $(-\pi, \pi)$.

Q.4 Solve any Two of the following.

10

- $(D^2 + a^2)y = \sec ax$
- Obtain the Fourier expansion of $f(x) = |x|$ in $(-\pi, \pi)$ deduce that

$$\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \dots$$
- Use variable separable method to solve $\frac{\partial z}{\partial x} + 4 \frac{\partial z}{\partial y} = 0$, given $z(0, y) = 8 e^{-3y}$

Section – II

Q.5 Solve any Three of the following.

09

- Find $L\{e^{2t}(\sin 2t + \cos 2t)^2\}$
- Find the inverse Laplace transform of following by using the Convolution theorem of $\left[\frac{1}{(s)(s^2+9)}\right]$
- Fit a first degree curve to the following data

x	1	2	3	4	5
y	14	27	40	55	68

- d) Fit a second degree parabola to following data:

x	1	2	3	4	5
y	1250	1400	1650	1950	2300

- e) Find coefficient of the following data

x	28	45	40	38	35	33	40	32	36	33
y	23	34	33	34	30	26	28	31	36	35

Q.6 Solve any Three of the following.

09

- a) Evaluate $\int_0^{\infty} \frac{e^{-t}-e^{-3t}}{t}$ by using laplace transform.
- b) Find the inverse Laplace transform of $\left[\frac{s+29}{(s+4)(s^2+9)} \right]$.
- c) In a large assignment of electric bulbs, 10% are defective. A random sample of 20 is taken for inspection. Using Binomial distribution, find the probability that:
- All are good bulbs
 - Exactly three are defective bulbs.
- d) Fit a poison distribution for following data:

x	0	1	2	3	4
f	109	65	22	3	1

- e) For the following data fit a curve of the form $y = ax^b$

x	1	2	3	4	5	6
y	12	9	6	2	11	5

Q.7 Solve any Two of the following.

10

- a) Use Laplace transform to solve $\frac{d^2y}{dt^2} - \frac{dy}{dt} - 2y = 20 \sin 2t$, where $y(0) = 1$; $y'(0) = 2$.
- b) The marks of 1000 students in a university are found to be normally distributed with mean 70 and standard deviation 5. Estimate the number of students whose marks will be:
- Between 60 & 75
 - More than 75
- (For SNV, z area under the curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- c) Find the equation of lines of regression and also coefficient of correlation from the following:

x:	57	42	38	42	45	44	40	46	44	43	40
y:	10	26	41	29	27	19	18	19	31	29	33

Seat No.	
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Set **P**

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

Environmental Laws and Impact Assessment (BTN01407)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No.1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following. 14

- 1) According to FCA 1980," To monitor the effective implementation of act _____ Committee/authority was constituted at the national level.
 - a) Compensatory Afforestation Management & Planning Authority
 - b) Forest Control Committee
 - c) Wildlife Conversation Authority
 - d) None of these
- 2) Which was the first article added to the constitution of India for the protection of the environment.
 - a) Article 41
 - b) Article 253
 - c) Article 51
 - d) Article 21
- 3) According to which article it is the duty of the State government to protect and improve the natural environment including forests, lakes, rivers, and wildlife.
 - a) Article 48A
 - b) Article 51A (clause g)
 - c) Article 19 (1) g
 - d) Article 21
- 4) According to article 253," there's a provision of imposing on every citizen in the form of fundamental _____ to help in the preservation of the natural environment.
 - a) Right
 - b) Duty
 - c) Responsibilities
 - d) All of these
- 5) Any person or Organization (either based in India or not) obtains any biological resources occurring in India for its research or commercial Utilization is prohibited in which Act.
 - a) Wildlife protection act
 - b) Biological Diversity Act
 - c) Forest Conservation Act
 - d) Water Act
- 6) Which conference was conducted by the UN under which various experts had discussions and provided policies regarding protecting the environment.
 - a) Stockholm Conference
 - b) United Nations Conference
 - c) Special session of UN General Assembly
 - d) Sustainability Development conference

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Environmental Laws and Impact Assessment (BTN01407)

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 8 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.

Section – I

- Q.2** a) Discuss importance of Biological diversity act 2002 for protection of natural Environment. **06**
 b) Explain salient feature of Water Act 1974. Differentiate functions of CPCB & SPCB described in Water Act 1974. **04**
- Q.3** a) Discuss importance of WLPA 1972 for protection of wildlife in forest. **05**
 b) Explain salient feature of IFA 1972. Analyze functional changes as per changing years in the law. **04**
- Q.4** a) Differentiate between Water Act 1974 and Water Cess act 1977. **05**
 b) Enlist various core values and principles of EIA. **04**
- Q.5** a) Enlist advantages and disadvantages of LCA **05**
 b) Explain PLI Act 1991 in detail. **04**

Section – II

- Q.6** a) Explain procedure of EIA with the help of flow sheet. **05**
 b) Discuss role of various authorities in Water Cess act 1977. **04**
- Q.7** a) Enlist advantages and disadvantages of LCA. **05**
 b) Explain PLI Act 1991 in detail. **04**
- Q.8** a) Examine salient feature of EIA methodologies. **06**
 b) Analysis numerous Laws introduced to minimize limitations of IFA 1927. **04**
- Q.9** **Write Short Notes.** **09**
 a) Components of EIA Report
 b) Adhoc method
 c) Inventory Analysis

**Seat
No.**

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100	1

Environmental Laws and Impact Assessment (BTN01407)

Max. Marks: 70

Instructions: 1) Q. No.1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Marks: 14

14

- 1) _____ Types of Forests are described in IFA 1927.
a) 5
b) 4
c) 3
d) 6
- 2) Central government of India under Article 48A enacted a new legislation called _____.
a) forest conservation Act
b) wildlife protection act
c) Indian forest act
d) Reserve forest act
- 3) Which was the first act after Independence for the protection of forest wildlife and in which year?
a) Wildlife Protection Act, 1972
b) Indian Forest Act, 1865
c) Forest Conservation Act, 1980
d) Biological Diversity Act, 2002
- 4) One person to be nominated by each of participating _____ from amongst the members the members of the local authority functioning within the state concerned.
a) Central Government
b) State Government
c) Local Authorities
d) None of these
- 5) The terms and conditions of the service of the member (other than the chairmen and the member-secretary) of the state board under _____ of section [5].
a) Subsection-8
b) Subsection-1
c) Subsection-2
d) Subsection-3
- 6) The water act comprises of _____ section which are divided into chapter.
a) 96 section 7
b) 68, 6
c) 64, 8
d) 67, 7
- 7) State board as to apply in the relation to the supersession of the central board or a _____ by the central government.
a) State board
b) Central board
c) Joint board
d) None of these

- 8) According to FCA 1980," To monitor the effective implementation of act _____ Committee/authority was constituted at the national level.
- a) Compensatory Afforestation Management & Planning Authority
 - b) Forest Control Committee
 - c) Wildlife Conversation Authority
 - d) None of these
- 9) Which was the first article added to the constitution of India for the protection of the environment.
- a) Article 41
 - b) Article 253
 - c) Article 51
 - d) Article 21
- 10) According to which article it is the duty of the State government to protect and improve the natural environment including forests, lakes, rivers, and wildlife.
- a) Article 48A
 - b) Article 51A (clause g)
 - c) Article 19 (1) g
 - d) Article 21
- 11) According to article 253," there's a provision of imposing on every citizen in the form of fundamental _____ to help in the preservation of the natural environment.
- a) Right
 - b) Duty
 - c) Responsibilities
 - d) All of these
- 12) Any person or Organization (either based in India or not) obtains any biological resources occurring in India for its research or commercial Utilization is prohibited in which Act.
- a) Wildlife protection act
 - b) Biological Diversity Act
 - c) Forest Conservation Act
 - d) Water Act
- 13) Which conference was conducted by the UN under which various experts had discussions and provided policies regarding protecting the environment.
- a) Stockholm Conference
 - b) United Nations Conference
 - c) Special session of UN General Assembly
 - d) Sustainability Development conference
- 14) When the stock Holm conference was conducted.
- a) 5 -16 JUNE, 1972
 - b) 5 -16 JULY, 1972
 - c) 17- 30 JUNE, 1972
 - d) 17 - 30 JULY,1972

Seat No.	
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Set	Q
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Environmental Laws and Impact Assessment (BTN01407)

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 8 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Discuss importance of Biological diversity act 2002 for protection of natural Environment. | 06 |
| | b) Explain salient feature of Water Act 1974. Differentiate functions of CPCB & SPCB described in Water Act 1974. | 04 |
| Q.3 | a) Discuss importance of WLPA 1972 for protection of wildlife in forest. | 05 |
| | b) Explain salient feature of IFA 1972. Analyze functional changes as per changing years in the law. | 04 |
| Q.4 | a) Differentiate between Water Act 1974 and Water Cess act 1977. | 05 |
| | b) Enlist various core values and principles of EIA. | 04 |
| Q.5 | a) Enlist advantages and disadvantages of LCA | 05 |
| | b) Explain PLI Act 1991 in detail. | 04 |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | a) Explain procedure of EIA with the help of flow sheet. | 05 |
| | b) Discuss role of various authorities in Water Cess act 1977. | 04 |
| Q.7 | a) Enlist advantages and disadvantages of LCA. | 05 |
| | b) Explain PLI Act 1991 in detail. | 04 |
| Q.8 | a) Examine salient feature of EIA methodologies. | 06 |
| | b) Analysis numerous Laws introduced to minimize limitations of IFA 1927. | 04 |
| Q.9 | Write Short Notes. | 09 |
| | a) Components of EIA Report | |
| | b) Adhoc method | |
| | c) Inventory Analysis | |

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Environmental Laws and Impact Assessment (BTN01407)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No.1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) One person to be nominated by each of participating _____ from amongst the members the members of the local authority functioning within the state concerned.
 - a) Central Government
 - b) State Government
 - c) Local Authorities
 - d) None of these
- 2) The terms and conditions of the service of the member (other than the chairmen and the member-secretary) of the state board under _____ of section [5].
 - a) Subsection-8
 - b) Subsection-1
 - c) Subsection-2
 - d) Subsection-3
- 3) The water act comprises of _____ section which are divided into chapter.
 - a) 96 section 7
 - b) 68, 6
 - c) 64, 8
 - d) 67, 7
- 4) State board as to apply in the relation to the supersession of the central board or a _____ by the central government.
 - a) State board
 - b) Central board
 - c) Joint board
 - d) None of these
- 5) According to FCA 1980," To monitor the effective implementation of act _____ Committee/authority was constituted at the national level.
 - a) Compensatory Afforestation Management & Planning Authority
 - b) Forest Control Committee
 - c) Wildlife Conversation Authority
 - d) None of these
- 6) Which was the first article added to the constitution of India for the protection of the environment.
 - a) Article 41
 - b) Article 253
 - c) Article 51
 - d) Article 21
- 7) According to which article it is the duty of the State government to protect and improve the natural environment including forests, lakes, rivers, and wildlife.
 - a) Article 48A
 - b) Article 51A (clause g)
 - c) Article 19 (1) g
 - d) Article 21

- Page 8 of 12

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Environmental Laws and Impact Assessment (BTN01407)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
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Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Discuss importance of Biological diversity act 2002 for protection of natural Environment. | 06 |
| | b) Explain salient feature of Water Act 1974. Differentiate functions of CPCB & SPCB described in Water Act 1974. | 04 |
| Q.3 | a) Discuss importance of WLPA 1972 for protection of wildlife in forest. | 05 |
| | b) Explain salient feature of IFA 1972. Analyze functional changes as per changing years in the law. | 04 |
| Q.4 | a) Differentiate between Water Act 1974 and Water Cess act 1977. | 05 |
| | b) Enlist various core values and principles of EIA. | 04 |
| Q.5 | a) Enlist advantages and disadvantages of LCA | 05 |
| | b) Explain PLI Act 1991 in detail. | 04 |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | a) Explain procedure of EIA with the help of flow sheet. | 05 |
| | b) Discuss role of various authorities in Water Cess act 1977. | 04 |
| Q.7 | a) Enlist advantages and disadvantages of LCA. | 05 |
| | b) Explain PLI Act 1991 in detail. | 04 |
| Q.8 | a) Examine salient feature of EIA methodologies. | 06 |
| | b) Analysis numerous Laws introduced to minimize limitations of IFA 1927. | 04 |
| Q.9 | Write Short Notes. | 09 |
| | a) Components of EIA Report | |
| | b) Adhoc method | |
| | c) Inventory Analysis | |

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Environmental Laws and Impact Assessment (BTN01407)

Day & Date: Saturday, 01-06-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No.1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following. 14

- 1) Which conference was conducted by the UN under which various experts had discussions and provided policies regarding protecting the environment.
 - a) Stockholm Conference
 - b) United Nations Conference
 - c) Special session of UN General Assembly
 - d) Sustainability Development conference
- 2) When the stock Holm conference was conducted.
 - a) 5 -16 JUNE, 1972
 - b) 5 -16 JULY, 1972
 - c) 17- 30 JUNE, 1972
 - d) 17 - 30 JULY, 1972
- 3) _____ Types of Forests are described in IFA 1927.
 - a) 5
 - b) 4
 - c) 3
 - d) 6
- 4) Central government of India under Article 48A enacted a new legislation called _____.
 - a) forest conservation Act
 - b) wildlife protection act
 - c) Indian forest act
 - d) Reserve forest act
- 5) Which was the first act after Independence for the protection of forest wildlife and in which year?
 - a) Wildlife Protection Act, 1972
 - b) Indian Forest Act, 1865
 - c) Forest Conservation Act, 1980
 - d) Biological Diversity Act, 2002
- 6) One person to be nominated by each of participating _____ from amongst the members the members of the local authority functioning within the state concerned.
 - a) Central Government
 - b) State Government
 - c) Local Authorities
 - d) None of these
- 7) The terms and conditions of the service of the member (other than the chairmen and the member-secretary) of the state board under _____ of section [5].
 - a) Subsection-8
 - b) Subsection-1
 - c) Subsection-2
 - d) Subsection-3

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Environmental Laws and Impact Assessment (BTN01407)

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 8 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.

Section – I

- Q.2** a) Discuss importance of Biological diversity act 2002 for protection of natural Environment. **06**
 b) Explain salient feature of Water Act 1974. Differentiate functions of CPCB & SPCB described in Water Act 1974. **04**
- Q.3** a) Discuss importance of WLPA 1972 for protection of wildlife in forest. **05**
 b) Explain salient feature of IFA 1972. Analyze functional changes as per changing years in the law. **04**
- Q.4** a) Differentiate between Water Act 1974 and Water Cess act 1977. **05**
 b) Enlist various core values and principles of EIA. **04**
- Q.5** a) Enlist advantages and disadvantages of LCA **05**
 b) Explain PLI Act 1991 in detail. **04**

Section – II

- Q.6** a) Explain procedure of EIA with the help of flow sheet. **05**
 b) Discuss role of various authorities in Water Cess act 1977. **04**
- Q.7** a) Enlist advantages and disadvantages of LCA. **05**
 b) Explain PLI Act 1991 in detail. **04**
- Q.8** a) Examine salient feature of EIA methodologies. **06**
 b) Analysis numerous Laws introduced to minimize limitations of IFA 1927. **04**
- Q.9** **Write Short Notes.** **09**
 a) Components of EIA Report
 b) Adhoc method
 c) Inventory Analysis

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Applications of Information Technology and Information systems
(BTN01408)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) _____ software is/are used in Project management.

a) Primavera	b) MSP
c) CATIA	d) a & b
- 2) Every optimization problem has three components viz, _____.

a) Objective function, guided path, distribution
b) Objective function, decision variables, guided path
c) Objective function, decision variables, constraints
d) All of the above
- 3) In a service industry _____ is/are the component/s of inventory.

a) information collected	b) reports
c) semi finished goods	d) a & b
- 4) Fast moving items are having _____ inventory ratio.

a) high	b) low
c) zero	d) none
- 5) Software can support project managers in all of their tasks such as _____.

a) Coordination	b) Documentation
c) Control	d) All of these
- 6) Benefits of Computer Applications in Construction technology are, _____.

a) Flexibility	b) Efficient communication
c) Consistent estimating	d) All of these
- 7) _____ is a civil engineering drafting software with a multitude of design, analysis and simulation tools for civil engineering design.

a) Civil 3D	b) Autocad
c) Primavera	d) MSP
- 8) Maximization problems are used for _____ computations.

a) Production	b) Profit
c) Both a & b	d) None

- 9) GIS uses the information from which of the following sources?
- a) Non-spatial information system
 - b) Spatial information system
 - c) Global information system
 - d) Position information system
- 10) In _____ inventory model, it is assumed that there is no uncertainty associated with demand.
- a) Deterministic
 - b) Probabilistic
 - c) Both a & b
 - d) None
- 11) Information technology deals with _____.
- a) information
 - b) data
 - c) knowledge
 - d) All of these
- 12) Principles of 3D printing include _____.
- a) Modelling
 - b) Printing
 - c) Finishing
 - d) All of these
- 13) Major goals of automated highway systems include, _____.
- a) Improve safety
 - b) Save money and optimize investment
 - c) Improve accessibility and mobility
 - d) All of these
- 14) Challenges in 3 D printing construction are _____.
- a) High costs
 - b) Labour shortage
 - c) Low cost
 - d) a & b

Seat No.	
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Set **P**

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

**Applications of Information Technology and Information systems
(BTN01408)**

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining.
3) Figures to the right indicate full marks.

Section – I

- Q.2** a) Explain in detail, Computer Aided Cost Estimation in construction industry. **05**
b) Explain Applications of Production Scheduling. **05**
- Q.3** a) Solve the following linear programming problem using any applicable method. **05**
Maximize, **04**
$$Z = 100x_1 + 80x_2$$

Subject to,
$$6x_1 + 4x_2 \leq 7200$$

$$2x_1 + 4x_2 \leq 4000$$

$$x_1, x_2 \geq 0$$
- Q.4** a) Explain the Engineering applications of optimization. **04**
b) State and explain optimization techniques. **05**
- Q.5** a) Explain in detail Dynamic Programming and enlist steps of Dynamic programming. **05**
b) Explain and enlist IT application used in construction. **04**

Section – II

- Q.6** a) What is project? Explain in detail Steps involved in managing the project. **05**
b) Explain in detail 3D Printing in construction. **05**
- Q.7** a) Explain in detail Automation techniques in Surveying. **05**
b) Explain in detail Scheduling in Project. **04**
- Q.8** a) Explain in brief Work Breakdown Structure (WBS) & its Uses. **05**
b) What are the roles & responsibilities of the Project Manager? **04**
- Q.9** a) Describe Procedure involved in Building Information Modelling. **05**
b) What are the automation techniques used in tunnel construction? **04**

Seat No.	
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**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

**Applications of Information Technology and Information systems
(BTN01408)**

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Maximization problems are used for _____ computations.

a) Production	b) Profit
c) Both a & b	d) None
- 2) GIS uses the information from which of the following sources?

a) Non-spatial information system
b) Spatial information system
c) Global information system
d) Position information system
- 3) In _____ inventory model, it is assumed that there is no uncertainty associated with demand.

a) Deterministic	b) Probabilistic
c) Both a & b	d) None
- 4) Information technology deals with _____.

a) information	b) data
c) knowledge	d) All of these
- 5) Principles of 3D printing include _____.

a) Modelling	b) Printing
c) Finishing	d) All of these
- 6) Major goals of automated highway systems include, _____.

a) Improve safety
b) Save money and optimize investment
c) Improve accessibility and mobility
d) All of these
- 7) Challenges in 3 D printing construction are _____.

a) High costs	b) Labour shortage
c) Low cost	d) a & b
- 8) _____ software is/are used in Project management.

a) Primavera	b) MSP
c) CATIA	d) a & b

- 9) Every optimization problem has three components viz, _____.
a) Objective function, guided path, distribution
b) Objective function, decision variables, guided path
c) Objective function, decision variables, constraints
d) All of the above
- 10) In a service industry _____ is/are the component/s of inventory.
a) information collected b) reports
c) semi finished goods d) a & b
- 11) Fast moving items are having _____ inventory ratio.
a) high b) low
c) zero d) none
- 12) Software can support project managers in all of their tasks such as _____.
a) Coordination b) Documentation
c) Control d) All of these
- 13) Benefits of Computer Applications in Construction technology are, _____.
a) Flexibility b) Efficient communication
c) Consistent estimating d) All of these
- 14) _____ is a civil engineering drafting software with a multitude of design, analysis and simulation tools for civil engineering design.
a) Civil 3D b) Autocad
c) Primavera d) MSP

Seat No.	
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Set

Q

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Applications of Information Technology and Information systems
(BTN01408)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining.
 3) Figures to the right indicate full marks.

Section – I

- Q.2** a) Explain in detail, Computer Aided Cost Estimation in construction industry. **05**
 b) Explain Applications of Production Scheduling. **05**
- Q.3** a) Solve the following linear programming problem using any applicable method. **05**
 Maximize, **04**

$$Z = 100x_1 + 80x_2$$

 Subject to,

$$6x_1 + 4x_2 \leq 7200$$

$$2x_1 + 4x_2 \leq 4000$$

$$x_1, x_2 \geq 0$$
- Q.4** a) Explain the Engineering applications of optimization. **04**
 b) State and explain optimization techniques. **05**
- Q.5** a) Explain in detail Dynamic Programming and enlist steps of Dynamic programming. **05**
 b) Explain and enlist IT application used in construction. **04**

Section – II

- Q.6** a) What is project? Explain in detail Steps involved in managing the project. **05**
 b) Explain in detail 3D Printing in construction. **05**
- Q.7** a) Explain in detail Automation techniques in Surveying. **05**
 b) Explain in detail Scheduling in Project. **04**
- Q.8** a) Explain in brief Work Breakdown Structure (WBS) & its Uses. **05**
 b) What are the roles & responsibilities of the Project Manager? **04**
- Q.9** a) Describe Procedure involved in Building Information Modelling. **05**
 b) What are the automation techniques used in tunnel construction? **04**

Seat No.	
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Applications of Information Technology and Information systems (BTN01408)

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Duration: 30 Minutes

Marks: 14

14

- 1) Information technology deals with _____.
a) information
b) data
c) knowledge
d) All of these
- 2) Principles of 3D printing include _____.
a) Modelling
b) Printing
c) Finishing
d) All of these
- 3) Major goals of automated highway systems include, _____.
a) Improve safety
b) Save money and optimize investment
c) Improve accessibility and mobility
d) All of these
- 4) Challenges in 3 D printing construction are _____.
a) High costs
b) Labour shortage
c) Low cost
d) a & b
- 5) _____ software is/are used in Project management.
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b) MSP
c) CATIA
d) a & b
- 6) Every optimization problem has three components viz, _____.
a) Objective function, guided path, distribution
b) Objective function, decision variables, guided path
c) Objective function, decision variables, constraints
d) All of the above
- 7) In a service industry _____ is/are the component/s of inventory.
a) information collected
b) reports
c) semi finished goods
d) a & b
- 8) Fast moving items are having _____ inventory ratio.
a) high
b) low
c) zero
d) none

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Seat No.	
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Set **R**

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING**

**Applications of Information Technology and Information systems
(BTN01408)**

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining.
3) Figures to the right indicate full marks.

Section – I

- Q.2** a) Explain in detail, Computer Aided Cost Estimation in construction industry. **05**
b) Explain Applications of Production Scheduling. **05**
- Q.3** a) Solve the following linear programming problem using any applicable method. **05**
Maximize, **04**
$$Z = 100x_1 + 80x_2$$

Subject to,
$$6x_1 + 4x_2 \leq 7200$$

$$2x_1 + 4x_2 \leq 4000$$

$$x_1, x_2 \geq 0$$
- Q.4** a) Explain the Engineering applications of optimization. **04**
b) State and explain optimization techniques. **05**
- Q.5** a) Explain in detail Dynamic Programming and enlist steps of Dynamic programming. **05**
b) Explain and enlist IT application used in construction. **04**

Section – II

- Q.6** a) What is project? Explain in detail Steps involved in managing the project. **05**
b) Explain in detail 3D Printing in construction. **05**
- Q.7** a) Explain in detail Automation techniques in Surveying. **05**
b) Explain in detail Scheduling in Project. **04**
- Q.8** a) Explain in brief Work Breakdown Structure (WBS) & its Uses. **05**
b) What are the roles & responsibilities of the Project Manager? **04**
- Q.9** a) Describe Procedure involved in Building Information Modelling. **05**
b) What are the automation techniques used in tunnel construction? **04**

Seat No.	
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Applications of Information Technology and Information systems (BTN01408)

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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3) Figures to the right indicates full marks.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Benefits of Computer Applications in Construction technology are, _____.
a) Flexibility
b) Efficient communication
c) Consistent estimating
d) All of these
- 2) _____ is a civil engineering drafting software with a multitude of design, analysis and simulation tools for civil engineering design.
a) Civil 3D
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d) MSP
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b) Profit
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- 6) Information technology deals with _____.
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c) knowledge
d) All of these
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a) Modelling
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- 8) Major goals of automated highway systems include, _____.
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- 10) _____ software is/are used in Project management.
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- 11) Every optimization problem has three components viz, _____.
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a) information collected
b) reports
c) semi finished goods
d) a & b
- 13) Fast moving items are having _____ inventory ratio.
a) high
b) low
c) zero
d) none
- 14) Software can support project managers in all of their tasks such as _____.
a) Coordination
b) Documentation
c) Control
d) All of these

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING

Applications of Information Technology and Information systems
(BTN01408)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining.
 3) Figures to the right indicate full marks.

Section – I

- Q.2** a) Explain in detail, Computer Aided Cost Estimation in construction industry. **05**
 b) Explain Applications of Production Scheduling. **05**
- Q.3** a) Solve the following linear programming problem using any applicable method. **05**
 Maximize, **04**

$$Z = 100x_1 + 80x_2$$

 Subject to,

$$6x_1 + 4x_2 \leq 7200$$

$$2x_1 + 4x_2 \leq 4000$$

$$x_1, x_2 \geq 0$$
- Q.4** a) Explain the Engineering applications of optimization. **04**
 b) State and explain optimization techniques. **05**
- Q.5** a) Explain in detail Dynamic Programming and enlist steps of Dynamic programming. **05**
 b) Explain and enlist IT application used in construction. **04**

Section – II

- Q.6** a) What is project? Explain in detail Steps involved in managing the project. **05**
 b) Explain in detail 3D Printing in construction. **05**
- Q.7** a) Explain in detail Automation techniques in Surveying. **05**
 b) Explain in detail Scheduling in Project. **04**
- Q.8** a) Explain in brief Work Breakdown Structure (WBS) & its Uses. **05**
 b) What are the roles & responsibilities of the Project Manager? **04**
- Q.9** a) Describe Procedure involved in Building Information Modelling. **05**
 b) What are the automation techniques used in tunnel construction? **04**

Seat No.	
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Max. Marks: 70

Marks: 14

14

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Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Design Thinking (BTN01409)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 6 is compulsory in Section II and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.
 5) Use of non-programmable calculator is allowed.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) What is meant by the Design Thinking? Difference between the design thinking and traditional approaches. | 06 |
| | b) Enlist the various different mindset of design thinking. Explain in details. | 04 |
| Q.3 | a) Enlist various methods of the customer need identification and explain in short. | 04 |
| | b) What do you meant by the customer need identification? What are the goals of the customer need? | 05 |
| Q.4 | a) What do you meant by the Creativity? How to apply the creativity. | 04 |
| | b) Explain the term of Low- Fi Prototype, Medium Fi- Prototype, and High Fi- Prototype | 05 |
| Q.5 | a) Enlist and explain in short of various design thinking principles. | 04 |
| | b) Explain the term of brainstorming with various types of brainstorming. | 05 |

Section – II

- | | | |
|------------|---|-----------|
| Q.6 | a) Explain the term of service design with the principles of service design. | 06 |
| | b) How the product development process useful for the service design. | 04 |
| Q.7 | a) Write a note on: Integral Product Architecture. | 04 |
| | b) Financial Analysis and Needs of Financial Analysis. | 05 |
| Q.8 | a) Explain in short the 7 Steps involved in design for environment process. | 04 |
| | b) Draw & explain in short the DFE to product life cycle. Also mention the three challenges of product design which are represented in life cycle. | 05 |
| Q.9 | a) What are the different Tools of used in Service Design | 04 |
| | b) Write a note on Product Architecture. | 05 |

Seat No.	
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Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.

Marks: 14

14

- Page 4 of 12

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Design Thinking (BTN01409)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 6 is compulsory in Section II and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.
 5) Use of non-programmable calculator is allowed.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) What is meant by the Design Thinking? Difference between the design thinking and traditional approaches. | 06 |
| | b) Enlist the various different mindset of design thinking. Explain in details. | 04 |
| Q.3 | a) Enlist various methods of the customer need identification and explain in short. | 04 |
| | b) What do you meant by the customer need identification? What are the goals of the customer need? | 05 |
| Q.4 | a) What do you meant by the Creativity? How to apply the creativity. | 04 |
| | b) Explain the term of Low- Fi Prototype, Medium Fi- Prototype, and High Fi- Prototype | 05 |
| Q.5 | a) Enlist and explain in short of various design thinking principles. | 04 |
| | b) Explain the term of brainstorming with various types of brainstorming. | 05 |

Section – II

- | | | |
|------------|---|-----------|
| Q.6 | a) Explain the term of service design with the principles of service design. | 06 |
| | b) How the product development process useful for the service design. | 04 |
| Q.7 | a) Write a note on: Integral Product Architecture. | 04 |
| | b) Financial Analysis and Needs of Financial Analysis. | 05 |
| Q.8 | a) Explain in short the 7 Steps involved in design for environment process. | 04 |
| | b) Draw & explain in short the DFE to product life cycle. Also mention the three challenges of product design which are represented in life cycle. | 05 |
| Q.9 | a) What are the different Tools of used in Service Design | 04 |
| | b) Write a note on Product Architecture. | 05 |

Seat No.	
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Set R

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Design Thinking (BTN01409)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) An integral architecture exhibits certain properties, such as _____.
 a) Functional elements of the product are implemented using more than one chunk
 b) The interactions between chunks are well defined and are generally fundamental to the primary functions of the product
 c) Chunks implement one or a few functional elements in their entirety.
 d) None of the above
- 2) Product architecture is the assignment of the _____ elements of a product to _____ building blocks of the product.
 a) Functional; conceptual b) Functional; physical
 c) Non-functional; conceptual d) Non-functional: physical
- 3) The Design for environment is done for _____.
 a) Part of product b) Entire product
 c) Entire life cycle of product d) Any of the above
- 4) One of the two categories of interactions between chunks is:
 a) Modular b) Integral
 c) Geometric d) Incidental
- 5) Design thinking starts with _____.
 a) Empathize b) Prototype
 c) Test d) Ideate
- 6) Design Thinking Mindsets: _____.
 a) Show, don't tell b) Focus on human values
 c) Be mindful of process d) All of Above
- 7) Interactions with customers during the data collection process are commonly documented by: _____.
 a) Audio and/or video recording b) Taking notes
 c) Taking photography d) All of the above

- 8) The latent customer needs are the those which _____.
a) Customers are unaware off and not fulfilled by existing products.
b) Customers are fully aware off and fulfilled by existing products.
c) Product developers recognize as critical customer needs.
d) Are widely recognized by the consumers and retailers.
- 9) Focus groups are one of the methods for: _____.
a) Interpreting raw data collected from customers
b) Organizing data into a hierarchy of customer needs
c) Gathering raw data from customers
d) Reflecting on the results and the process of identifying customer need.
- 10) Types of Prototype: _____.
a) Low Fi Prototype
b) Medium Fi Prototype
c) High Fi Prototype
d) All of Above
- 11) In Concept Generation Process, Dividing a problem into simpler sub problems is called as _____.
a) Problem Decomposition
b) Sub Problem
c) Clarify the Problem
d) None of Above
- 12) The term "Service design" was coined by _____.
a) Lynn Shostack
b) Lynn Mayer
c) Lynn Collins
d) None of Above
- 13) Design Service Process variation should be kept to a _____.
a) Maximum
b) Minimum
c) Equal
d) None of above
- 14) The Control and inspection of process in service design must be kept to a _____.
a) Minimum
b) Maximum
c) Equal
d) None of above

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Design Thinking (BTN01409)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 6 is compulsory in Section II and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.
 5) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) What is meant by the Design Thinking? Difference between the design thinking and traditional approaches. **06**
 b) Enlist the various different mindset of design thinking. Explain in details. **04**
- Q.3** a) Enlist various methods of the customer need identification and explain in short. **04**
 b) What do you meant by the customer need identification? What are the goals of the customer need? **05**
- Q.4** a) What do you meant by the Creativity? How to apply the creativity. **04**
 b) Explain the term of Low- Fi Prototype, Medium Fi- Prototype, and High Fi- Prototype **05**
- Q.5** a) Enlist and explain in short of various design thinking principles. **04**
 b) Explain the term of brainstorming with various types of brainstorming. **05**

Section – II

- Q.6** a) Explain the term of service design with the principles of service design. **06**
 b) How the product development process useful for the service design. **04**
- Q.7** a) Write a note on: Integral Product Architecture. **04**
 b) Financial Analysis and Needs of Financial Analysis. **05**
- Q.8** a) Explain in short the 7 Steps involved in design for environment process. **04**
 b) Draw & explain in short the DFE to product life cycle. Also mention the three challenges of product design which are represented in life cycle. **05**
- Q.9** a) What are the different Tools of used in Service Design **04**
 b) Write a note on Product Architecture. **05**

Seat No.	
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Max. Marks: 70

MCQ/Objective Type Questions

Marks: 14

14

- Page 10 of 12

- 9) One of the two categories of interactions between chunks is:
 - a) Modular
 - b) Integral
 - c) Geometric
 - d) Incidental
- 10) Design thinking starts with _____.
 - a) Empathize
 - b) Prototype
 - c) Test
 - d) Ideate
- 11) Design Thinking Mindsets: _____.
 - a) Show, don't tell
 - b) Focus on human values
 - c) Be mindful of process
 - d) All of Above
- 12) Interactions with customers during the data collection process are commonly documented by: _____.
 - a) Audio and/or video recording
 - b) Taking notes
 - c) Taking photography
 - d) All of the above
- 13) The latent customer needs are the those which _____.
 - a) Customers are unaware off and not fulfilled by existing products.
 - b) Customers are fully aware off and fulfilled by existing products.
 - c) Product developers recognize as critical customer needs.
 - d) Are widely recognized by the consumers and retailers.
- 14) Focus groups are one of the methods for: _____.
 - a) Interpreting raw data collected from customers
 - b) Organizing data into a hierarchy of customer needs
 - c) Gathering raw data from customers
 - d) Reflecting on the results and the process of identifying customer need.

Seat No.	
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Set S

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Design Thinking (BTN01409)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 6 is compulsory in Section II and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.
 5) Use of non-programmable calculator is allowed.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) What is meant by the Design Thinking? Difference between the design thinking and traditional approaches. | 06 |
| | b) Enlist the various different mindset of design thinking. Explain in details. | 04 |
| Q.3 | a) Enlist various methods of the customer need identification and explain in short. | 04 |
| | b) What do you meant by the customer need identification? What are the goals of the customer need? | 05 |
| Q.4 | a) What do you meant by the Creativity? How to apply the creativity. | 04 |
| | b) Explain the term of Low- Fi Prototype, Medium Fi- Prototype, and High Fi- Prototype | 05 |
| Q.5 | a) Enlist and explain in short of various design thinking principles. | 04 |
| | b) Explain the term of brainstorming with various types of brainstorming. | 05 |

Section – II

- | | | |
|------------|---|-----------|
| Q.6 | a) Explain the term of service design with the principles of service design. | 06 |
| | b) How the product development process useful for the service design. | 04 |
| Q.7 | a) Write a note on: Integral Product Architecture. | 04 |
| | b) Financial Analysis and Needs of Financial Analysis. | 05 |
| Q.8 | a) Explain in short the 7 Steps involved in design for environment process. | 04 |
| | b) Draw & explain in short the DFE to product life cycle. Also mention the three challenges of product design which are represented in life cycle. | 05 |
| Q.9 | a) What are the different Tools of used in Service Design | 04 |
| | b) Write a note on Product Architecture. | 05 |

Seat No.	
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Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

Marks: 14

14

- 1) The role of which agency is important in disaster prevention.

a) Media	b) Police
c) Government officials	d) Public
- 2) What are the consequences of disaster on a society?

a) Loss of life	b) Damage to property
c) Environmental Damages	d) All of the above
- 3) The primary result of earthquakes is _____.

a) Building and bridge collapsed
b) Rapture of water and gas pipelines
c) Change in course of river and creation of new islands
d) All of the above
- 4) What are the major consequences of Tropical cyclones?

a) Fierce wind	b) Heavy rain
c) Storm surge	d) All of the above
- 5) Disaster management is aimed at

a) Resettling people in the closest unaffected urban area
b) Collection of valuable data for future management objectives
c) Strengthening sewage and drinking water treatment facilities to resist the impact of a future disaster
d) Restoring a community's services, facilities and residences to pre-disaster levels
- 6) Hazards and Disasters are mainly classified as

a) Physical and chemical	b) Natural and Human induced
c) Physical and Human	d) Social and cultural
- 7) A hazard is a situation where there is

a) Threat of natural calamity
b) Threat to property and lives from calamities
c) Threat for consequences of disaster
d) All of the above

- 8) Which area in the world witness's highest seismic earthquake activity in the world.
- a) Mid-continental belt
 - b) Cir-cum Pacific belt
 - c) Mid-Atlantic belt
 - d) All of the above
- 9) Which are the major controlling systems for reduction of volcanic disaster?
- a) Prediction for early warning of eruption
 - b) Timely evolution and relief work
 - c) Both a and b
 - d) None of the above
- 10) The most essential item that the disaster-stricken populations must be provided with is _____.
- a) Shelter material
 - b) Drinking water
 - c) Fuel
 - d) All of the above
- 11) What type of disaster is most prominent in India?
- a) Flood
 - b) Draught
 - c) Cyclone
 - d) Earthquake
- 12) Volcanic eruption is closely associated with _____.
- a) Mountain building and fracturing
 - b) Deforestation
 - c) Landslides
 - d) Heat budget
- 13) Warning about cyclonic disaster is convened through
- a) Newspaper
 - b) Radio network
 - c) Television
 - d) All of the Above
- 14) Structural and Non-structural measures are elements of high category of Risk Reduction measures _____.
- a) Socio-economic measures
 - b) Physical measures
 - c) Environmental measures
 - d) Post disaster measures

Seat No.	
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Set P

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Disaster Management (BTN01410)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from Section – I.
2) Solve any two Questions from Section – II.
3) Figures to the right indicates full marks.

Section – I

- Q.2** a) Explain in detail Disaster Management Cycle. **07**
 b) Define: **07**
 i) Hazard
 ii) Risk
 iii) Vulnerability
 iv) Disaster
- Q.3** a) Explain Geological Disasters with examples. **07**
 b) Explain chemical, biological and nuclear disaster with example. **07**
- Q.4** a) Explain any one case study example of Disaster Management from India region. **07**
 b) Explain accidents with its types. **07**

Section – II

- Q.5** a) Explain in detail factors affecting mitigation measures. **07**
 b) Explain various methods of information collection. **07**
- Q.6** a) Explain various types of communication systems. **07**
 b) Define early warning system and explain its types. **07**
- Q.7** a) Explain role of Remote Sensing and GIS applications in Disaster Management process. **07**
 b) Explain the role of Communication in the process of Disaster Management. **07**

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Disaster Management (BTN01410)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Which area in the world witness's highest seismic earthquake activity in the world.
 - a) Mid-continental belt
 - b) Cir-cum Pacific belt
 - c) Mid-Atlantic belt
 - d) All of the above
- 2) Which are the major controlling systems for reduction of volcanic disaster?
 - a) Prediction for early warning of eruption
 - b) Timely evolution and relief work
 - c) Both a and b
 - d) None of the above
- 3) The most essential item that the disaster-stricken populations must be provided with is _____.
 - a) Shelter material
 - b) Drinking water
 - c) Fuel
 - d) All of the above
- 4) What type of disaster is most prominent in India?
 - a) Flood
 - b) Draught
 - c) Cyclone
 - d) Earthquake
- 5) Volcanic eruption is closely associated with _____.
 - a) Mountain building and fracturing
 - b) Deforestation
 - c) Landslides
 - d) Heat budget
- 6) Warning about cyclonic disaster is convened through
 - a) Newspaper
 - b) Radio network
 - c) Television
 - d) All of the Above
- 7) Structural and Non-structural measures are elements of high category of Risk Reduction measures _____.
 - a) Socio-economic measures
 - b) Physical measures
 - c) Environmental measures
 - d) Post disaster measures

- 8) The role of which agency is important in disaster prevention.
- a) Media
 - b) Police
 - c) Government officials
 - d) Public
- 9) What are the consequences of disaster on a society?
- a) Loss of life
 - b) Damage to property
 - c) Environmental Damages
 - d) All of the above
- 10) The primary result of earthquakes is ____.
- a) Building and bridge collapsed
 - b) Rapture of water and gas pipelines
 - c) Change in course of river and creation of new islands
 - d) All of the above
- 11) What are the major consequences of Tropical cyclones?
- a) Fierce wind
 - b) Heavy rain
 - c) Storm surge
 - d) All of the above
- 12) Disaster management is aimed at
- a) Resettling people in the closest unaffected urban area
 - b) Collection of valuable data for future management objectives
 - c) Strengthening sewage and drinking water treatment facilities to resist the impact of a future disaster
 - d) Restoring a community's services, facilities and residences to pre-disaster levels
- 13) Hazards and Disasters are mainly classified as
- a) Physical and chemical
 - b) Natural and Human induced
 - c) Physical and Human
 - d) Social and cultural
- 14) A hazard is a situation where there is
- a) Threat of natural calamity
 - b) Threat to property and lives from calamities
 - c) Threat for consequences of disaster
 - d) All of the above

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Disaster Management (BTN01410)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from Section – I.
2) Solve any two Questions from Section – II.
3) Figures to the right indicates full marks.

Section – I

- Q.2** **a)** Explain in detail Disaster Management Cycle. **07**
 b) Define: **07**
 i) Hazard
 ii) Risk
 iii) Vulnerability
 iv) Disaster
- Q.3** **a)** Explain Geological Disasters with examples. **07**
 b) Explain chemical, biological and nuclear disaster with example. **07**
- Q.4** **a)** Explain any one case study example of Disaster Management from India **07**
 region.
 b) Explain accidents with its types. **07**

Section – II

- Q.5** **a)** Explain in detail factors affecting mitigation measures. **07**
 b) Explain various methods of information collection. **07**
- Q.6** **a)** Explain various types of communication systems. **07**
 b) Define early warning system and explain its types. **07**
- Q.7** **a)** Explain role of Remote Sensing and GIS applications in Disaster **07**
 Management process.
 b) Explain the role of Communication in the process of Disaster Management. **07**

Seat No.	
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Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

Marks: 14

14

- Page 7 of 12

- 9) Disaster management is aimed at
- a) Resettling people in the closest unaffected urban area
 - b) Collection of valuable data for future management objectives
 - c) Strengthening sewage and drinking water treatment facilities to resist the impact of a future disaster
 - d) Restoring a community's services, facilities and residences to pre-disaster levels
- 10) Hazards and Disasters are mainly classified as
- a) Physical and chemical
 - b) Natural and Human induced
 - c) Physical and Human
 - d) Social and cultural
- 11) A hazard is a situation where there is
- a) Threat of natural calamity
 - b) Threat to property and lives from calamities
 - c) Threat for consequences of disaster
 - d) All of the above
- 12) Which area in the world witness's highest seismic earthquake activity in the world.
- a) Mid-continental belt
 - b) Cir-cum Pacific belt
 - c) Mid-Atlantic belt
 - d) All of the above
- 13) Which are the major controlling systems for reduction of volcanic disaster?
- a) Prediction for early warning of eruption
 - b) Timely evolution and relief work
 - c) Both a and b
 - d) None of the above
- 14) The most essential item that the disaster-stricken populations must be provided with is _____.
- a) Shelter material
 - b) Drinking water
 - c) Fuel
 - d) All of the above

Seat No.	
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Set R

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Disaster Management (BTN01410)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from Section – I.
2) Solve any two Questions from Section – II.
3) Figures to the right indicates full marks.

Section – I

- Q.2** **a)** Explain in detail Disaster Management Cycle. **07**
 b) Define: **07**
 i) Hazard
 ii) Risk
 iii) Vulnerability
 iv) Disaster
- Q.3** **a)** Explain Geological Disasters with examples. **07**
 b) Explain chemical, biological and nuclear disaster with example. **07**
- Q.4** **a)** Explain any one case study example of Disaster Management from India **07**
 region.
 b) Explain accidents with its types. **07**

Section – II

- Q.5** **a)** Explain in detail factors affecting mitigation measures. **07**
 b) Explain various methods of information collection. **07**
- Q.6** **a)** Explain various types of communication systems. **07**
 b) Define early warning system and explain its types. **07**
- Q.7** **a)** Explain role of Remote Sensing and GIS applications in Disaster **07**
 Management process.
 b) Explain the role of Communication in the process of Disaster Management. **07**

Seat No.	
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Set	S
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Disaster Management (BTN01410)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Hazards and Disasters are mainly classified as
 - a) Physical and chemical
 - b) Natural and Human induced
 - c) Physical and Human
 - d) Social and cultural
- 2) A hazard is a situation where there is
 - a) Threat of natural calamity
 - b) Threat to property and lives from calamities
 - c) Threat for consequences of disaster
 - d) All of the above
- 3) Which area in the world witness's highest seismic earthquake activity in the world.
 - a) Mid-continental belt
 - b) Cir-cum Pacific belt
 - c) Mid-Atlantic belt
 - d) All of the above
- 4) Which are the major controlling systems for reduction of volcanic disaster?
 - a) Prediction for early warning of eruption
 - b) Timely evolution and relief work
 - c) Both a and b
 - d) None of the above
- 5) The most essential item that the disaster-stricken populations must be provided with is _____.
 - a) Shelter material
 - b) Drinking water
 - c) Fuel
 - d) All of the above
- 6) What type of disaster is most prominent in India?
 - a) Flood
 - b) Draught
 - c) Cyclone
 - d) Earthquake
- 7) Volcanic eruption is closely associated with _____.
 - a) Mountain building and fracturing
 - b) Deforestation
 - c) Landslides
 - d) Heat budget

Seat No.	
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Set S

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
CIVIL ENGINEERING
Disaster Management (BTN01410)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from Section – I.
2) Solve any two Questions from Section – II.
3) Figures to the right indicates full marks.

Section – I

- Q.2** **a)** Explain in detail Disaster Management Cycle. **07**
 b) Define: **07**
 i) Hazard
 ii) Risk
 iii) Vulnerability
 iv) Disaster
- Q.3** **a)** Explain Geological Disasters with examples. **07**
 b) Explain chemical, biological and nuclear disaster with example. **07**
- Q.4** **a)** Explain any one case study example of Disaster Management from India **07**
 region.
 b) Explain accidents with its types. **07**

Section – II

- Q.5** **a)** Explain in detail factors affecting mitigation measures. **07**
 b) Explain various methods of information collection. **07**
- Q.6** **a)** Explain various types of communication systems. **07**
 b) Define early warning system and explain its types. **07**
- Q.7** **a)** Explain role of Remote Sensing and GIS applications in Disaster **07**
 Management process.
 b) Explain the role of Communication in the process of Disaster Management. **07**

Seat No.	
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Day & Date: Monday, 13-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume data wherever necessary.
- 5) Use of Steam tables is allowed.
- 6) Use of Scientific calculator is allowed.
- 7) Neat diagrams must be drawn wherever necessary.

Marks:14

14

- Page 1 of 16

- 8) The conversion of sonic flow into supersonic flow from inlet to exit may be obtained from a duct of _____
- Diverging cross-sectional area type
 - converging-diverging cross-sectional area type
 - Converging cross sectional area type
 - None of these
- 9) In a shell and tube surface condenser _____.
 - steam and cooling water mix to give the condensate
 - cooling water passes through the tubes and steam surrounds them
 - steam passes the cooling tubes and cooling water surrounds them
 - all of the above varying with situation
- 10) In surface condenser if air is removed, there is _____
 - fall in absolute pressure maintained in condenser
 - rise in absolute pressure maintained in condenser
 - no change in absolute pressure in condenser
 - rise in temp. of condensed steam
- 11) In case of reaction steam turbine
 - there is enthalpy drop both in fixed and moving blades
 - there is enthalpy drop only in fixed blades
 - there is enthalpy drop only in moving blades
 - none of these
- 12) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is _____.
 - $\rho = \cos 2\alpha$
 - $\rho = \cos \alpha$
 - $\rho = (\cos \alpha)/2$
 - $\rho = (\cos 2\alpha)/2$
- 13) With increase in clearance volume, the ideal work of compressing 1 kg of air _____.
 - increase
 - decreases
 - remains same
 - first increases and then decreases
- 14) The compression work requirement is minimum in case of the compression following process of _____.
 - Adiabatic type
 - Isochoric type
 - Isothermal type
 - Hyperbolic type

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Applied Thermodynamics (BTN02301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Use of Steam tables and Mollier diagram is allowed.
 4) Use of Scientific calculator is allowed.
 5) Neat diagrams must be drawn wherever necessary.
 6) Out of remaining questions solve any two questions from each section.

Section – I

Q.2 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Standard Enthalpy of Reaction | |
| ii) Standard enthalpy of Formation | |
| b) A reversible heat engine operates between three constant temperature reservoirs at 600 K, 400K and 300K. It receives 2500 KJ of heat from the reservoir at 600 K and does 1000 KJ of work. Determine the direction and magnitude of the heat interaction with the other two reservoirs. | 05 |
| c) A hot copper block of mass 30 kg having temperature of 500 °C is dropped in 200 kg of oil at 20 °C. If $C_{p \text{ oil}} = 2.5 \text{ kJ/kgK}$ and $C_{p \text{ copper}} = 0.5 \text{ kJ/kgK}$, find the change in entropy of universe. Consider adiabatic mixing. | 05 |

Q.3 Attempt the following questions

- | | |
|---|-----------|
| a) State and Explain Kelvin-Planck and Clausius statements of second law of thermodynamics. | 04 |
| b) Write a short note on classification of Boilers. | 05 |
| c) A boiler produces wet steam having dryness fraction 0.98. The working pressure of boiler is 7.5 bar absolute It generates steam at the rate of 5400 kg/hr and consumes coal at the rate of 670 kg/hr, if the calorific value of coal is 31,000 kJ/kg and water is fed at temperature of 41.5 °C, calculate | 05 |
| i) equivalent evaporation/kg of coal | |
| ii) factor of evaporation | |
| iii) boiler efficiency. | |

Q.4 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Equivalent evaporation | |
| ii) Boiler efficiency | |
| b) Explain the effect of various operating conditions on Rankine cycle efficiency. | 05 |

- c) A Rankine cycle has steam entering the turbine at 140 bar and 550 °C. If the exhaust pressure of turbine is 0.65 bar, and all processes are reversible, find: 05
- i) Cycle thermal efficiency
 - ii) Work ratio
 - iii) Specific steam consumption

Section – II

Q.5 Attempt the following questions

- a) What is nozzle? What are its different types? 04
- b) What do you mean by compounding of steam turbines? Discuss velocity compounding of steam turbine with neat sketch. 05
- c) The steam at 300 m/s is supplied to a single stage impulse turbine through a nozzle. The nozzle angle is 25°. The mean diameter of the blade rotar is 100 cm and speed of the rotar is 2000 rpm. Find suitable blade angles if there is no axial thrust. If blade velocity coefficient is 0.9 & steam flow rate is 10 kg/s, find power developed by the blade. 05

Q.6 Attempt the following questions

- a) Differentiate between surface condenser and jet condenser. 04
- b) What are the sources of air leakage in condenser? Explain the effect of air leakage on the performance of condenser. 05
- c) Derive an expression for maximum blade efficiency of a single stage impulse turbine. 05

Q.7 Attempt the following questions

- a) Derive the expression for work done per kg for polytropic compression process without considering the clearance volume. 04
- b) Derive the equation for condition for optimum interstage pressure for two stage reciprocating compressors with perfect intercooling. Hence obtain minimum work required for two stage reciprocating compressors. 05
- c) A single stage, single acting compressor delivers 150 m³ of free air per minute from 1 bar to 8 bar. The speed of compressor is 300 rpm. Assuming that compression and expansion follows the law $p v^{1.3} = C$ and clearance is $(1/16)^{\text{th}}$ of swept volume, find the diameter and stroke of the compressor. Take $L/D = 1.5$ and $n = 1.3$ 05

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Applied Thermodynamics (BTN02301)

Day & Date: Monday, 13-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 - 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume data wherever necessary.
 - 5) Use of Steam tables is allowed.
 - 6) Use of Scientific calculator is allowed.
 - 7) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The conversion of sonic flow into supersonic flow from inlet to exit may be obtained from a duct of _____.
 - a) Diverging cross-sectional area type
 - b) converging-diverging cross-sectional area type
 - c) Converging cross sectional area type
 - d) None of these
- 2) In a shell and tube surface condenser _____.
 - a) steam and cooling water mix to give the condensate
 - b) cooling water passes through the tubes and steam surrounds them
 - c) steam passes the cooling tubes and cooling water surrounds them
 - d) all of the above varying with situation
- 3) In surface condenser if air is removed, there is _____.
 - a) fall in absolute pressure maintained in condenser
 - b) rise in absolute pressure maintained in condenser
 - c) no change in absolute pressure in condenser
 - d) rise in temp. of condensed steam
- 4) In case of reaction steam turbine
 - a) there is enthalpy drop both in fixed and moving blades
 - b) there is enthalpy drop only in fixed blades
 - c) there is enthalpy drop only in moving blades
 - d) none of these
- 5) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is _____.

a) $\rho = \cos 2\alpha$	b) $\rho = \cos \alpha$
c) $\rho = (\cos \alpha)/2$	d) $\rho = (\cos 2\alpha)/2$

- 6) With increase in clearance volume, the ideal work of compressing 1 kg of air _____
a) increase
b) decreases
c) remains same
d) first increases and then decreases
- 7) The compression work requirement is minimum in case of the compression following process of _____
a) Adiabatic type
b) Isochoric type
c) Isothermal type
d) Hyperbolic type
- 8) Standard enthalpy of reaction is positive for _____ reactions.
a) Exothermic
b) Endothermic
c) Thermoneutral
d) None of these
- 9) Which of the following is correct in reference to first law of thermodynamics?
a) No difference between heat and work
b) No indication of direction of process
c) Law of energy conservation
d) All of these
- 10) Critical point pressure and temperature for water are, _____.
a) 22.12 MPa and 374.15°C
b) MPa and -268°C
c) 18.2 MPa and 899°C
d) None of these
- 11) Second law of thermodynamics defines _____.
a) heat
b) work
c) entropy
d) internal energy
- 12) The major heat loss in boiler is due to _____.
a) Moisture in fuel
b) Dry flue gases
c) steam formation
d) Unburnt fuel
- 13) The amount of water evaporated in kg per kg of fuel burnt is called _____.
a) Equivalent evaporation
b) Evaporative Capacity
c) Boiler efficiency
d) None of the Above
- 14) The steam is superheated in boiler at _____.
a) Isothermal process
b) Isobaric process
c) Isochoric process
d) None of these

Seat No.	
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Set **Q**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Applied Thermodynamics (BTN02301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Use of Steam tables and Mollier diagram is allowed.
 4) Use of Scientific calculator is allowed.
 5) Neat diagrams must be drawn wherever necessary.
 6) Out of remaining questions solve any two questions from each section.

Section – I

Q.2 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Standard Enthalpy of Reaction | |
| ii) Standard enthalpy of Formation | |
| b) A reversible heat engine operates between three constant temperature reservoirs at 600 K, 400K and 300K. It receives 2500 KJ of heat from the reservoir at 600 K and does 1000 KJ of work. Determine the direction and magnitude of the heat interaction with the other two reservoirs. | 05 |
| c) A hot copper block of mass 30 kg having temperature of 500 °C is dropped in 200 kg of oil at 20 °C. If $C_{p \text{ oil}} = 2.5 \text{ kJ/kgK}$ and $C_{p \text{ copper}} = 0.5 \text{ kJ/kgK}$, find the change in entropy of universe. Consider adiabatic mixing. | 05 |

Q.3 Attempt the following questions

- | | |
|---|-----------|
| a) State and Explain Kelvin-Planck and Clausius statements of second law of thermodynamics. | 04 |
| b) Write a short note on classification of Boilers. | 05 |
| c) A boiler produces wet steam having dryness fraction 0.98. The working pressure of boiler is 7.5 bar absolute It generates steam at the rate of 5400 kg/hr and consumes coal at the rate of 670 kg/hr, if the calorific value of coal is 31,000 kJ/kg and water is fed at temperature of 41.5 °C, calculate | 05 |
| i) equivalent evaporation/kg of coal | |
| ii) factor of evaporation | |
| iii) boiler efficiency. | |

Q.4 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Equivalent evaporation | |
| ii) Boiler efficiency | |
| b) Explain the effect of various operating conditions on Rankine cycle efficiency. | 05 |

- c) A Rankine cycle has steam entering the turbine at 140 bar and 550 °C. If the exhaust pressure of turbine is 0.65 bar, and all processes are reversible, find: 05
- i) Cycle thermal efficiency
 - ii) Work ratio
 - iii) Specific steam consumption

Section – II

Q.5 Attempt the following questions

- a) What is nozzle? What are its different types? 04
- b) What do you mean by compounding of steam turbines? Discuss velocity compounding of steam turbine with neat sketch. 05
- c) The steam at 300 m/s is supplied to a single stage impulse turbine through a nozzle. The nozzle angle is 25°. The mean diameter of the blade rotar is 100 cm and speed of the rotar is 2000 rpm. Find suitable blade angles if there is no axial thrust. If blade velocity coefficient is 0.9 & steam flow rate is 10 kg/s, find power developed by the blade. 05

Q.6 Attempt the following questions

- a) Differentiate between surface condenser and jet condenser. 04
- b) What are the sources of air leakage in condenser? Explain the effect of air leakage on the performance of condenser. 05
- c) Derive an expression for maximum blade efficiency of a single stage impulse turbine. 05

Q.7 Attempt the following questions

- a) Derive the expression for work done per kg for polytropic compression process without considering the clearance volume. 04
- b) Derive the equation for condition for optimum interstage pressure for two stage reciprocating compressors with perfect intercooling. Hence obtain minimum work required for two stage reciprocating compressors. 05
- c) A single stage, single acting compressor delivers 150 m³ of free air per minute from 1 bar to 8 bar. The speed of compressor is 300 rpm. Assuming that compression and expansion follows the law $p v^{1.3} = C$ and clearance is $(1/16)^{\text{th}}$ of swept volume, find the diameter and stroke of the compressor. Take $L/D = 1.5$ and $n = 1.3$ 05

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Applied Thermodynamics (BTN02301)

Day & Date: Monday, 13-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume data wherever necessary.
5) Use of Steam tables is allowed.
6) Use of Scientific calculator is allowed.
7) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) In case of reaction steam turbine
 - a) there is enthalpy drop both in fixed and moving blades
 - b) there is enthalpy drop only in fixed blades
 - c) there is enthalpy drop only in moving blades
 - d) none of these
- 2) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is _____.
 - a) $\rho = \cos 2\alpha$
 - b) $\rho = \cos \alpha$
 - c) $\rho = (\cos \alpha)/2$
 - d) $\rho = (\cos 2\alpha)/2$
- 3) With increase in clearance volume, the ideal work of compressing 1 kg of air _____.
 - a) increase
 - b) decreases
 - c) remains same
 - d) first increases and then decreases
- 4) The compression work requirement is minimum in case of the compression following process of _____.
 - a) Adiabatic type
 - b) Isochoric type
 - c) Isothermal type
 - d) Hyperbolic type
- 5) Standard enthalpy of reaction is positive for _____ reactions.
 - a) Exothermic
 - b) Endothermic
 - c) Thermoneutral
 - d) None of these
- 6) Which of the following is correct in reference to first law of thermodynamics?
 - a) No difference between heat and work
 - b) No indication of direction of process
 - c) Law of energy conservation
 - d) All of these

- 7) Critical point pressure and temperature for water are, _____.
a) 22.12 MPa and 374.15°C b) MPa and -268°C
c) 18.2 MPa and 899°C d) None of these
- 8) Second law of thermodynamics defines _____.
a) heat b) work
c) entropy d) internal energy
- 9) The major heat loss in boiler is due to _____.
a) Moisture in fuel b) Dry flue gases
c) steam formation d) Unburnt fuel
- 10) The amount of water evaporated in kg per kg of fuel burnt is called _____.
a) Equivalent evaporation b) Evaporative Capacity
c) Boiler efficiency d) None of the Above
- 11) The steam is superheated in boiler at _____.
a) Isothermal process b) Isobaric process
c) Isochoric process d) None of these
- 12) The conversion of sonic flow into supersonic flow from inlet to exit may be obtained from a duct of _____.
a) Diverging cross-sectional area type
b) converging-diverging cross-sectional area type
c) Converging cross sectional area type
d) None of these
- 13) In a shell and tube surface condenser _____.
a) steam and cooling water mix to give the condensate
b) cooling water passes through the tubes and steam surrounds them
c) steam passes the cooling tubes and cooling water surrounds them
d) all of the above varying with situation
- 14) In surface condenser if air is removed, there is _____.
a) fall in absolute pressure maintained in condenser
b) rise in absolute pressure maintained in condenser
c) no change in absolute pressure in condenser
d) rise in temp. of condensed steam

Seat No.	
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Set **R**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Applied Thermodynamics (BTN02301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Use of Steam tables and Mollier diagram is allowed.
 4) Use of Scientific calculator is allowed.
 5) Neat diagrams must be drawn wherever necessary.
 6) Out of remaining questions solve any two questions from each section.

Section – I

Q.2 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Standard Enthalpy of Reaction | |
| ii) Standard enthalpy of Formation | |
| b) A reversible heat engine operates between three constant temperature reservoirs at 600 K, 400K and 300K. It receives 2500 KJ of heat from the reservoir at 600 K and does 1000 KJ of work. Determine the direction and magnitude of the heat interaction with the other two reservoirs. | 05 |
| c) A hot copper block of mass 30 kg having temperature of 500 °C is dropped in 200 kg of oil at 20 °C. If $C_{p \text{ oil}} = 2.5 \text{ kJ/kgK}$ and $C_{p \text{ copper}} = 0.5 \text{ kJ/kgK}$, find the change in entropy of universe. Consider adiabatic mixing. | 05 |

Q.3 Attempt the following questions

- | | |
|---|-----------|
| a) State and Explain Kelvin-Planck and Clausius statements of second law of thermodynamics. | 04 |
| b) Write a short note on classification of Boilers. | 05 |
| c) A boiler produces wet steam having dryness fraction 0.98. The working pressure of boiler is 7.5 bar absolute It generates steam at the rate of 5400 kg/hr and consumes coal at the rate of 670 kg/hr, if the calorific value of coal is 31,000 kJ/kg and water is fed at temperature of 41.5 °C, calculate | 05 |
| i) equivalent evaporation/kg of coal | |
| ii) factor of evaporation | |
| iii) boiler efficiency. | |

Q.4 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Equivalent evaporation | |
| ii) Boiler efficiency | |
| b) Explain the effect of various operating conditions on Rankine cycle efficiency. | 05 |

- c) A Rankine cycle has steam entering the turbine at 140 bar and 550 °C. If the exhaust pressure of turbine is 0.65 bar, and all processes are reversible, find: 05
- i) Cycle thermal efficiency
 - ii) Work ratio
 - iii) Specific steam consumption

Section – II

Q.5 Attempt the following questions

- a) What is nozzle? What are its different types? 04
- b) What do you mean by compounding of steam turbines? Discuss velocity compounding of steam turbine with neat sketch. 05
- c) The steam at 300 m/s is supplied to a single stage impulse turbine through a nozzle. The nozzle angle is 25°. The mean diameter of the blade rotar is 100 cm and speed of the rotar is 2000 rpm. Find suitable blade angles if there is no axial thrust. If blade velocity coefficient is 0.9 & steam flow rate is 10 kg/s, find power developed by the blade. 05

Q.6 Attempt the following questions

- a) Differentiate between surface condenser and jet condenser. 04
- b) What are the sources of air leakage in condenser? Explain the effect of air leakage on the performance of condenser. 05
- c) Derive an expression for maximum blade efficiency of a single stage impulse turbine. 05

Q.7 Attempt the following questions

- a) Derive the expression for work done per kg for polytropic compression process without considering the clearance volume. 04
- b) Derive the equation for condition for optimum interstage pressure for two stage reciprocating compressors with prefect intercooling. Hence obtain minimum work required for two stage reciprocating compressors. 05
- c) A single stage, single acting compressor delivers 150 m³ of free air per minute from 1 bar to 8 bar. The speed of compressor is 300 rpm. Assuming that compression and expansion follows the law $p v^{1.3} = C$ and clearance is $(1/16)^{\text{th}}$ of swept volume, find the diameter and stroke of the compressor. Take $L/D = 1.5$ and $n = 1.3$ 05

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Applied Thermodynamics (BTN02301)

Day & Date: Monday, 13-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 - 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume data wherever necessary.
 - 5) Use of Steam tables is allowed.
 - 6) Use of Scientific calculator is allowed.
 - 7) Neat diagrams must be drawn wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The amount of water evaporated in kg per kg of fuel burnt is called _____.
 - a) Equivalent evaporation
 - b) Evaporative Capacity
 - c) Boiler efficiency
 - d) None of the Above
- 2) The steam is superheated in boiler at _____.
 - a) Isothermal process
 - b) Isobaric process
 - c) Isochoric process
 - d) None of these
- 3) The conversion of sonic flow into supersonic flow from inlet to exit may be obtained from a duct of _____.
 - a) Diverging cross-sectional area type
 - b) converging-diverging cross-sectional area type
 - c) Converging cross sectional area type
 - d) None of these
- 4) In a shell and tube surface condenser _____.
 - a) steam and cooling water mix to give the condensate
 - b) cooling water passes through the tubes and steam surrounds them
 - c) steam passes the cooling tubes and cooling water surrounds them
 - d) all of the above varying with situation
- 5) In surface condenser if air is removed, there is _____.
 - a) fall in absolute pressure maintained in condenser
 - b) rise in absolute pressure maintained in condenser
 - c) no change in absolute pressure in condenser
 - d) rise in temp. of condensed steam
- 6) In case of reaction steam turbine
 - a) there is enthalpy drop both in fixed and moving blades
 - b) there is enthalpy drop only in fixed blades
 - c) there is enthalpy drop only in moving blades
 - d) none of these

- 7) For maximum blade efficiency for single stage impulse turbine, speed ratio (ρ) is _____.
a) $\rho = \cos 2\alpha$
b) $\rho = \cos \alpha$
c) $\rho = (\cos \alpha)/2$
d) $\rho = (\cos 2\alpha)/2$
- 8) With increase in clearance volume, the ideal work of compressing 1 kg of air _____.
a) increase
b) decreases
c) remains same
d) first increases and then decreases
- 9) The compression work requirement is minimum in case of the compression following process of _____.
a) Adiabatic type
b) Isochoric type
c) Isothermal type
d) Hyperbolic type
- 10) Standard enthalpy of reaction is positive for _____ reactions.
a) Exothermic
b) Endothermic
c) Thermoneutral
d) None of these
- 11) Which of the following is correct in reference to first law of thermodynamics?
a) No difference between heat and work
b) No indication of direction of process
c) Law of energy conservation
d) All of these
- 12) Critical point pressure and temperature for water are, _____.
a) 22.12 MPa and 374.15°C
b) MPa and -268°C
c) 18.2 MPa and 899°C
d) None of these
- 13) Second law of thermodynamics defines _____.
a) heat
b) work
c) entropy
d) internal energy
- 14) The major heat loss in boiler is due to _____.
a) Moisture in fuel
b) Dry flue gases
c) steam formation
d) Unburnt fuel

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Applied Thermodynamics (BTN02301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Use of Steam tables and Mollier diagram is allowed.
 4) Use of Scientific calculator is allowed.
 5) Neat diagrams must be drawn wherever necessary.
 6) Out of remaining questions solve any two questions from each section.

Section – I

Q.2 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Standard Enthalpy of Reaction | |
| ii) Standard enthalpy of Formation | |
| b) A reversible heat engine operates between three constant temperature reservoirs at 600 K, 400K and 300K. It receives 2500 KJ of heat from the reservoir at 600 K and does 1000 KJ of work. Determine the direction and magnitude of the heat interaction with the other two reservoirs. | 05 |
| c) A hot copper block of mass 30 kg having temperature of 500 °C is dropped in 200 kg of oil at 20 °C. If $C_{p \text{ oil}} = 2.5 \text{ kJ/kgK}$ and $C_{p \text{ copper}} = 0.5 \text{ kJ/kgK}$, find the change in entropy of universe. Consider adiabatic mixing. | 05 |

Q.3 Attempt the following questions

- | | |
|---|-----------|
| a) State and Explain Kelvin-Planck and Clausius statements of second law of thermodynamics. | 04 |
| b) Write a short note on classification of Boilers. | 05 |
| c) A boiler produces wet steam having dryness fraction 0.98. The working pressure of boiler is 7.5 bar absolute It generates steam at the rate of 5400 kg/hr and consumes coal at the rate of 670 kg/hr, if the calorific value of coal is 31,000 kJ/kg and water is fed at temperature of 41.5 °C, calculate | 05 |
| i) equivalent evaporation/kg of coal | |
| ii) factor of evaporation | |
| iii) boiler efficiency. | |

Q.4 Attempt the following questions

- | | |
|--|-----------|
| a) Explain the following terms: | 04 |
| i) Equivalent evaporation | |
| ii) Boiler efficiency | |
| b) Explain the effect of various operating conditions on Rankine cycle efficiency. | 05 |

- c) A Rankine cycle has steam entering the turbine at 140 bar and 550 °C. If the exhaust pressure of turbine is 0.65 bar, and all processes are reversible, find: **05**
- Cycle thermal efficiency
 - Work ratio
 - Specific steam consumption

Section – II

Q.5 Attempt the following questions

- What is nozzle? What are its different types? **04**
- What do you mean by compounding of steam turbines? Discuss velocity compounding of steam turbine with neat sketch. **05**
- The steam at 300 m/s is supplied to a single stage impulse turbine through a nozzle. The nozzle angle is 25°. The mean diameter of the blade rotar is 100 cm and speed of the rotar is 2000 rpm. Find suitable blade angles if there is no axial thrust. If blade velocity coefficient is 0.9 & steam flow rate is 10 kg/s, find power developed by the blade. **05**

Q.6 Attempt the following questions

- Differentiate between surface condenser and jet condenser. **04**
- What are the sources of air leakage in condenser? Explain the effect of air leakage on the performance of condenser. **05**
- Derive an expression for maximum blade efficiency of a single stage impulse turbine. **05**

Q.7 Attempt the following questions

- Derive the expression for work done per kg for polytropic compression process without considering the clearance volume. **04**
- Derive the equation for condition for optimum interstage pressure for two stage reciprocating compressors with perfect intercooling. Hence obtain minimum work required for two stage reciprocating compressors. **05**
- A single stage, single acting compressor delivers 150 m³ of free air per minute from 1 bar to 8 bar. The speed of compressor is 300 rpm. Assuming that compression and expansion follows the law $p v^{1.3} = C$ and clearance is $(1/16)^{\text{th}}$ of swept volume, find the diameter and stroke of the compressor. Take $L/D = 1.5$ and $n = 1.3$ **05**

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Mechanics of Materials (BTN02302)

Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) Diameter of Mohr's circle always represents _____.
a) Maximum shear stress
b) Difference between two principal stresses
c) Minimum principal stress
d) Mean value of principal stress
- 2) The unit of strain energy is _____.
a) No unit
b) Joule
c) MPa
d) mm⁴
- 3) For cantilever carrying UVL the shape of the BMD is _____.
a) Triangular
b) Rectangular
c) Parabolic
d) Cubic
- 4) For the same area, the strongest section of a beam under bending is _____.
a) rectangular section
b) T-section
c) circular section
d) I-section
- 5) Modulus of elasticity is defined as the ratio of _____.
a) shear stress to shear strain
b) lateral strain to linear strain
c) linear stress to lateral strain
d) linear stress to linear strain
- 6) For an inverted T-section, maximum shear stress occurs at _____.
a) the junction of flanges and web
b) the top of the section
c) the neutral axis
d) the bottom of the section
- 7) For a simply supported beam of length l carrying a point load W at the centre, maximum slope is given by _____.
a) $Wl^2/16EI$
b) $Wl^2/2EI$
c) $Wl^2/8EI$
d) $Wl^2/24EI$
- 8) The angle of twist _____ proportional to the twisting moment.
a) Inversely
b) Directly
c) either (a) or (b)
d) none of above

- 9) The strain energy stored by a body within elastic limit when loaded externally is called _____.
a) Modulus of resilience b) Proof Resilience
c) Resilience d) None of above
- 10) For a cantilever loaded with one-point load applied not at the free end, the maximum deflection occurs at the _____.
a) fixed end b) load point
c) free end d) both a and b
- 11) Bending moments at supports in case of simply supported beams is always _____.
a) Less than unity b) More than unity
c) zero d) none of above
- 12) Stress-strain curves are obtained by conducting the following test on materials, _____.
a) Impact test b) Torsion test
c) Tension test d) Compression test
- 13) The polar moment of inertia for circular section is _____.
a) $\frac{\pi}{64} D^4$ b) $\frac{\pi}{32} D^4$
c) $\frac{\pi}{32} D^3$ d) none of the above
- 14) If σ_1 and σ_2 are the maximum and minimum principle stresses respectively, then the diameter of Mohr's circle is _____.
a) $(\sigma_1 - \sigma_2)$ b) $1/2(\sigma_1 - \sigma_2)$
c) $1/2(\sigma_1 + \sigma_2)$ d) $(\sigma_1 + \sigma_2)$

Seat No.	
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Set **P**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechanics of Materials (BTN02302)

Day & Date: Tuesday, 14-05-2024
 Time: 03:00 PM To 06:00 PM

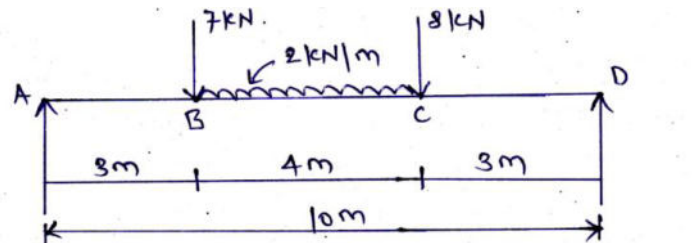
Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Use of calculator is allowed.
 4) Assume additional suitable data, if necessary and mention it clearly.

Section – I

- Q.2 a)** A steel rod of 35 mm diameter and 5000 mm long is connected to two grips and rod is maintained at temp. 85°C. Determine Thermal Stress and Pull exerted (P) when temp falls to 35°C.
 i) The ends do not yield.
 ii) The ends yield by gap 1.4 mm.
 Take: $E = 2 \times 10^5 \text{ N/mm}^2$ and $\alpha = 12 \times 10^{-6}/^\circ\text{C}$ **07**
- b)** Prove that: $T/J = \tau/R = G\theta/L$ **07**

- Q.3 a)** Draw SFD and BMD for beam shown in figure below. Also find Max. B.M. **07**



- b)** Two vertical rods, one of Steel and the other of Copper are rigidly fixed at top and a 60 cm apart. The diameter and the length of each rod are 3 cm and 5 cm respectively. A cross-bar fixed to the rods at the lower ends carries a load of 8 kN such that the cross-bar remains horizontal even after loading. Determine the load carried by each material and stress in each rod. Take E for Steel = 210 GPa and E for Copper = 90 GPa. **07**
- Q.4 a)** Define the following terms: **04**
 i) Point of Contra-Shear
 ii) Point of Contra-flexure
- b)** A hollow shaft is to transmit 300 kW at 2 r.p.s. If the shear stress is not to exceed 75 N/mm^2 and internal diameter is 0.6 of the external diameter, find the external and internal diameters by assuming that the maximum torque is 1.20 times the mean. **05**
- c)** A Wagon weighing 45 kN is attached to a wire rope and moving down an incline at a speed of 3.6 km/hr when the rope jams and the wagon is suddenly brought to rest. If the length of the rope is 80 m at the time of sudden stoppage. Calculate the maximum instantaneous stress and maximum instantaneous elongation produced. **05**
 Diameter of rope = 50 mm, $E = 200 \text{ GN/m}^2$.

Section – II

- Q.5** a) At a point in strained material the principal stresses are 130 MPa and 50 MPa. Both are tensile. It also carries a shear stress of 20 MPa such that it tends to rotate the element anticlockwise when associated with major principal plane. The plane inclined at 35° with major principal plane. Determine the normal, tangential and resultant stress on oblique plane along with of obliquity. (Use Mohr's Circle Method only) **07**
- b) An Inverted T-section has the flange 200 mm x 20 mm and web 200 mm x 20 mm. A vertical Shear force of 50 kN acts on it when web is held vertically. Determine the maximum intensity of shear stress and plot the shear stress distribution across the section. **07**
- Q.6** a) At a point in strained material is subjected to tensile stress of 150 N/mm^2 and compressive stress of 90 N/mm^2 acting right angle to each other. The plane inclined at 30° with compressive stress axis. Determine the normal, tangential and resultant stress on inclined plane. Also find angle of obliquity. **07**
- b) A cantilever beam of span 3 m is 20 cm wide and 30 cm deep. It carries a U.D.L. of 20 kN/m on its entire span and a point load of 35 kN at its free end. Calculate maximum slope and deflection at free end. Take, $E = 1 \times 10^4 \text{ N/mm}^2$. **07**
- Q.7** a) Using 'Moment-Area' method, determine the expressions for the maximum Slope and Deflection for a cantilever beam carrying point load 'W' at free end. **05**
- b) The symmetrical I-section is 200 mm wide and 250 mm deep. The flange & web thickness 20 mm. This section is used for cantilever beam having length 4 m subjected to point load at free end. Find the value to point load (W), if $E = 200 \text{ GPa}$ and maximum allowable bending stress is 150 N/mm^2 . **05**
- c) Write a short note on Pure Bending of Beam with neat sketch. **04**

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Mechanics of Materials (BTN02302)

Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The angle of twist _____ proportional to the twisting moment.
 - a) Inversely
 - b) Directly
 - c) either (a) or (b)
 - d) none of above
- 2) The strain energy stored by a body within elastic limit when loaded externally is called _____.
 - a) Modulus of resilience
 - b) Proof Resilience
 - c) Resilience
 - d) None of above
- 3) For a cantilever loaded with one-point load applied not at the free end, the maximum deflection occurs at the _____.
 - a) fixed end
 - b) load point
 - c) free end
 - d) both a and b
- 4) Bending moments at supports in case of simply supported beams is always _____.
 - a) Less than unity
 - b) More than unity
 - c) zero
 - d) none of above
- 5) Stress-strain curves are obtained by conducting the following test on materials, _____.
 - a) Impact test
 - b) Torsion test
 - c) Tension test
 - d) Compression test
- 6) The polar moment of inertia for circular section is _____.
 - a) $\frac{\pi}{64} D^4$
 - b) $\frac{\pi}{32} D^4$
 - c) $\frac{\pi}{32} D^3$
 - d) none of the above
- 7) If σ_1 and σ_2 are the maximum and minimum principle stresses respectively, then the diameter of Mohr's circle is _____.
 - a) $(\sigma_1 - \sigma_2)$
 - b) $1/2(\sigma_1 - \sigma_2)$
 - c) $1/2(\sigma_1 + \sigma_2)$
 - d) $(\sigma_1 + \sigma_2)$

- 8) Diameter of Mohr's circle always represents _____.
a) Maximum shear stress
b) Difference between two principal stresses
c) Minimum principal stress
d) Mean value of principal stress
- 9) The unit of strain energy is _____.
a) No unit
b) Joule
c) MPa
d) mm^4
- 10) For cantilever carrying UVL the shape of the BMD is _____.
a) Triangular
b) Rectangular
c) Parabolic
d) Cubic
- 11) For the same area, the strongest section of a beam under bending is _____.
a) rectangular section
b) T-section
c) circular section
d) I-section
- 12) Modulus of elasticity is defined as the ratio of _____.
a) shear stress to shear strain
b) lateral strain to linear strain
c) linear stress to lateral strain
d) linear stress to linear strain
- 13) For an inverted T-section, maximum shear stress occurs at _____.
a) the junction of flanges and web
b) the top of the section
c) the neutral axis
d) the bottom of the section
- 14) For a simply supported beam of length l carrying a point load W at the centre, maximum slope is given by _____.
a) $Wl^2/16EI$
b) $Wl^2/2EI$
c) $Wl^2/8EI$
d) $Wl^2/24EI$

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Set **Q**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechanics of Materials (BTN02302)

Day & Date: Tuesday, 14-05-2024
 Time: 03:00 PM To 06:00 PM

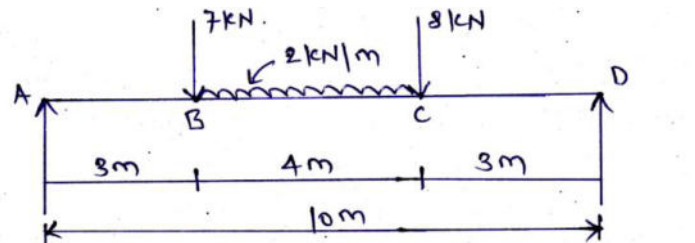
Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
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 4) Assume additional suitable data, if necessary and mention it clearly.

Section – I

- Q.2 a)** A steel rod of 35 mm diameter and 5000 mm long is connected to two grips and rod is maintained at temp. 85°C. Determine Thermal Stress and Pull exerted (P) when temp falls to 35°C. **07**
 i) The ends do not yield.
 ii) The ends yield by gap 1.4 mm.
 Take: $E = 2 \times 10^5 \text{ N/mm}^2$ and $\alpha = 12 \times 10^{-6}/^\circ\text{C}$
- b)** Prove that: $T/J = \tau/R = G\theta/L$ **07**

- Q.3 a)** Draw SFD and BMD for beam shown in figure below. Also find Max. B.M. **07**



- b)** Two vertical rods, one of Steel and the other of Copper are rigidly fixed at top and a 60 cm apart. The diameter and the length of each rod are 3 cm and 5 cm respectively. A cross-bar fixed to the rods at the lower ends carries a load of 8 kN such that the cross-bar remains horizontal even after loading. Determine the load carried by each material and stress in each rod. Take E for Steel = 210 GPa and E for Copper = 90 GPa. **07**
- Q.4 a)** Define the following terms: **04**
 i) Point of Contra-Shear
 ii) Point of Contra-flexure
- b)** A hollow shaft is to transmit 300 kW at 2 r.p.s. If the shear stress is not to exceed 75 N/mm^2 and internal diameter is 0.6 of the external diameter, find the external and internal diameters by assuming that the maximum torque is 1.20 times the mean. **05**
- c)** A Wagon weighing 45 kN is attached to a wire rope and moving down an incline at a speed of 3.6 km/hr when the rope jams and the wagon is suddenly brought to rest. If the length of the rope is 80 m at the time of sudden stoppage. Calculate the maximum instantaneous stress and maximum instantaneous elongation produced. **05**
 Diameter of rope = 50 mm, $E = 200 \text{ GN/m}^2$.

Section – II

- Q.5** a) At a point in strained material the principal stresses are 130 MPa and 50 MPa. Both are tensile. It also carries a shear stress of 20 MPa such that it tends to rotate the element anticlockwise when associated with major principal plane. The plane inclined at 35° with major principal plane. Determine the normal, tangential and resultant stress on oblique plane along with of obliquity. (Use Mohr's Circle Method only) **07**
- b) An Inverted T-section has the flange 200 mm x 20 mm and web 200 mm x 20 mm. A vertical Shear force of 50 kN acts on it when web is held vertically. Determine the maximum intensity of shear stress and plot the shear stress distribution across the section. **07**
- Q.6** a) At a point in strained material is subjected to tensile stress of 150 N/mm^2 and compressive stress of 90 N/mm^2 acting right angle to each other. The plane inclined at 30° with compressive stress axis. Determine the normal, tangential and resultant stress on inclined plane. Also find angle of obliquity. **07**
- b) A cantilever beam of span 3 m is 20 cm wide and 30 cm deep. It carries a U.D.L. of 20 kN/m on its entire span and a point load of 35 kN at its free end. Calculate maximum slope and deflection at free end. Take, $E = 1 \times 10^4 \text{ N/mm}^2$. **07**
- Q.7** a) Using 'Moment-Area' method, determine the expressions for the maximum Slope and Deflection for a cantilever beam carrying point load 'W' at free end. **05**
- b) The symmetrical I-section is 200 mm wide and 250 mm deep. The flange & web thickness 20 mm. This section is used for cantilever beam having length 4 m subjected to point load at free end. Find the value to point load (W), if $E = 200 \text{ GPa}$ and maximum allowable bending stress is 150 N/mm^2 . **05**
- c) Write a short note on Pure Bending of Beam with neat sketch. **04**

Seat No.	
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- 8) For the same area, the strongest section of a beam under bending is ____.
- a) rectangular section b) T-section
c) circular section d) I-section
- 9) Modulus of elasticity is defined as the ratio of ____.
- a) shear stress to shear strain b) lateral strain to linear strain
c) linear stress to lateral strain d) linear stress to linear strain
- 10) For an inverted T-section, maximum shear stress occurs at ____.
- a) the junction of flanges and web
b) the top of the section
c) the neutral axis
d) the bottom of the section
- 11) For a simply supported beam of length l carrying a point load W at the centre, maximum slope is given by ____.
- a) $Wl^2/16EI$ b) $Wl^2/2EI$
c) $Wl^2/8EI$ d) $Wl^2/24EI$
- 12) The angle of twist ____ proportional to the twisting moment.
- a) Inversely b) Directly
c) either (a) or (b) d) none of above
- 13) The strain energy stored by a body within elastic limit when loaded externally is called ____.
- a) Modulus of resilience b) Proof Resilience
c) Resilience d) None of above
- 14) For a cantilever loaded with one-point load applied not at the free end, the maximum deflection occurs at the ____.
- a) fixed end b) load point
c) free end d) both a and b

Seat No.	
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Set **R**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechanics of Materials (BTN02302)

Day & Date: Tuesday, 14-05-2024
 Time: 03:00 PM To 06:00 PM

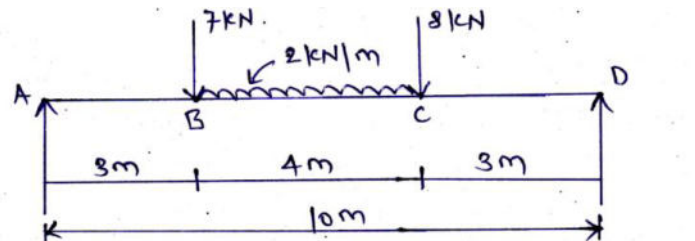
Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Use of calculator is allowed.
 4) Assume additional suitable data, if necessary and mention it clearly.

Section – I

- Q.2 a)** A steel rod of 35 mm diameter and 5000 mm long is connected to two grips and rod is maintained at temp. 85°C. Determine Thermal Stress and Pull exerted (P) when temp falls to 35°C. **07**
 i) The ends do not yield.
 ii) The ends yield by gap 1.4 mm.
 Take: $E = 2 \times 10^5 \text{ N/mm}^2$ and $\alpha = 12 \times 10^{-6}/^\circ\text{C}$
- b)** Prove that: $T/J = \tau/R = G\theta/L$ **07**

- Q.3 a)** Draw SFD and BMD for beam shown in figure below. Also find Max. B.M. **07**



- b)** Two vertical rods, one of Steel and the other of Copper are rigidly fixed at top and a 60 cm apart. The diameter and the length of each rod are 3 cm and 5 cm respectively. A cross-bar fixed to the rods at the lower ends carries a load of 8 kN such that the cross-bar remains horizontal even after loading. Determine the load carried by each material and stress in each rod. Take E for Steel = 210 GPa and E for Copper = 90 GPa. **07**
- Q.4 a)** Define the following terms: **04**
 i) Point of Contra-Shear
 ii) Point of Contra-flexure
- b)** A hollow shaft is to transmit 300 kW at 2 r.p.s. If the shear stress is not to exceed 75 N/mm^2 and internal diameter is 0.6 of the external diameter, find the external and internal diameters by assuming that the maximum torque is 1.20 times the mean. **05**
- c)** A Wagon weighing 45 kN is attached to a wire rope and moving down an incline at a speed of 3.6 km/hr when the rope jams and the wagon is suddenly brought to rest. If the length of the rope is 80 m at the time of sudden stoppage. Calculate the maximum instantaneous stress and maximum instantaneous elongation produced. **05**
 Diameter of rope = 50 mm, $E = 200 \text{ GN/m}^2$.

Section – II

- Q.5** a) At a point in strained material the principal stresses are 130 MPa and 50 MPa. Both are tensile. It also carries a shear stress of 20 MPa such that it tends to rotate the element anticlockwise when associated with major principal plane. The plane inclined at 35° with major principal plane. Determine the normal, tangential and resultant stress on oblique plane along with of obliquity. (Use Mohr's Circle Method only) **07**
- b) An Inverted T-section has the flange 200 mm x 20 mm and web 200 mm x 20 mm. A vertical Shear force of 50 kN acts on it when web is held vertically. Determine the maximum intensity of shear stress and plot the shear stress distribution across the section. **07**
- Q.6** a) At a point in strained material is subjected to tensile stress of 150 N/mm^2 and compressive stress of 90 N/mm^2 acting right angle to each other. The plane inclined at 30° with compressive stress axis. Determine the normal, tangential and resultant stress on inclined plane. Also find angle of obliquity. **07**
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- Q.7** a) Using 'Moment-Area' method, determine the expressions for the maximum Slope and Deflection for a cantilever beam carrying point load 'W' at free end. **05**
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- c) Write a short note on Pure Bending of Beam with neat sketch. **04**

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Mechanics of Materials (BTN02302)

Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the given options.

14

- 1) For an inverted T-section, maximum shear stress occurs at _____.
a) the junction of flanges and web
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- 2) For a simply supported beam of length l carrying a point load W at the centre, maximum slope is given by _____.
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b) $Wl^2/2EI$
c) $Wl^2/8EI$
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- 3) The angle of twist _____ proportional to the twisting moment.
a) Inversely
b) Directly
c) either (a) or (b)
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- 4) The strain energy stored by a body within elastic limit when loaded externally is called _____.
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c) Resilience
d) None of above
- 5) For a cantilever loaded with one-point load applied not at the free end, the maximum deflection occurs at the _____.
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c) zero
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- 7) Stress-strain curves are obtained by conducting the following test on materials, _____.
a) Impact test
b) Torsion test
c) Tension test
d) Compression test

- 8) The polar moment of inertia for circular section is _____.
a) $\frac{\pi}{64} D^4$ b) $\frac{\pi}{32} D^4$
c) $\frac{\pi}{32} D^3$ d) none of the above
- 9) If σ_1 and σ_2 are the maximum and minimum principle stresses respectively, then the diameter of Mohr's circle is _____.
a) $(\sigma_1 - \sigma_2)$ b) $1/2(\sigma_1 - \sigma_2)$
c) $1/2(\sigma_1 + \sigma_2)$ d) $(\sigma_1 + \sigma_2)$
- 10) Diameter of Mohr's circle always represents _____.
a) Maximum shear stress
b) Difference between two principal stresses
c) Minimum principal stress
d) Mean value of principal stress
- 11) The unit of strain energy is _____.
a) No unit b) Joule
c) MPa d) mm⁴
- 12) For cantilever carrying UVL the shape of the BMD is _____.
a) Triangular b) Rectangular
c) Parabolic d) Cubic
- 13) For the same area, the strongest section of a beam under bending is _____.
a) rectangular section b) T-section
c) circular section d) I-section
- 14) Modulus of elasticity is defined as the ratio of _____.
a) shear stress to shear strain b) lateral strain to linear strain
c) linear stress to lateral strain d) linear stress to linear strain

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechanics of Materials (BTN02302)

Day & Date: Tuesday, 14-05-2024
 Time: 03:00 PM To 06:00 PM

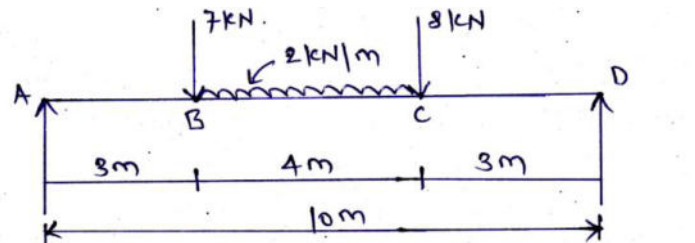
Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Use of calculator is allowed.
 4) Assume additional suitable data, if necessary and mention it clearly.

Section – I

- Q.2 a)** A steel rod of 35 mm diameter and 5000 mm long is connected to two grips and rod is maintained at temp. 85°C. Determine Thermal Stress and Pull exerted (P) when temp falls to 35°C.
 i) The ends do not yield.
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 Take: $E = 2 \times 10^5 \text{ N/mm}^2$ and $\alpha = 12 \times 10^{-6}/^\circ\text{C}$ **07**
- b)** Prove that: $T/J = \tau/R = G\theta/L$ **07**

- Q.3 a)** Draw SFD and BMD for beam shown in figure below. Also find Max. B.M. **07**



- b)** Two vertical rods, one of Steel and the other of Copper are rigidly fixed at top and a 60 cm apart. The diameter and the length of each rod are 3 cm and 5 cm respectively. A cross-bar fixed to the rods at the lower ends carries a load of 8 kN such that the cross-bar remains horizontal even after loading. Determine the load carried by each material and stress in each rod. Take E for Steel = 210 GPa and E for Copper = 90 GPa. **07**
- Q.4 a)** Define the following terms: **04**
 i) Point of Contra-Shear
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- b)** A hollow shaft is to transmit 300 kW at 2 r.p.s. If the shear stress is not to exceed 75 N/mm^2 and internal diameter is 0.6 of the external diameter, find the external and internal diameters by assuming that the maximum torque is 1.20 times the mean. **05**
- c)** A Wagon weighing 45 kN is attached to a wire rope and moving down an incline at a speed of 3.6 km/hr when the rope jams and the wagon is suddenly brought to rest. If the length of the rope is 80 m at the time of sudden stoppage. Calculate the maximum instantaneous stress and maximum instantaneous elongation produced. **05**
 Diameter of rope = 50 mm, $E = 200 \text{ GN/m}^2$.

Section – II

- Q.5** a) At a point in strained material the principal stresses are 130 MPa and 50 MPa. Both are tensile. It also carries a shear stress of 20 MPa such that it tends to rotate the element anticlockwise when associated with major principal plane. The plane inclined at 35° with major principal plane. Determine the normal, tangential and resultant stress on oblique plane along with of obliquity. (Use Mohr's Circle Method only) **07**
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- Q.6** a) At a point in strained material is subjected to tensile stress of 150 N/mm^2 and compressive stress of 90 N/mm^2 acting right angle to each other. The plane inclined at 30° with compressive stress axis. Determine the normal, tangential and resultant stress on inclined plane. Also find angle of obliquity. **07**
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- Q.7** a) Using 'Moment-Area' method, determine the expressions for the maximum Slope and Deflection for a cantilever beam carrying point load 'W' at free end. **05**
- b) The symmetrical I-section is 200 mm wide and 250 mm deep. The flange & web thickness 20 mm. This section is used for cantilever beam having length 4 m subjected to point load at free end. Find the value to point load (W), if $E = 200 \text{ GPa}$ and maximum allowable bending stress is 150 N/mm^2 . **05**
- c) Write a short note on Pure Bending of Beam with neat sketch. **04**

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Manufacturing Processes (BTN02303)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Make suitable assumptions, if required and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Objective questions with one correct answer.

14

- 1) The ability of the moulding sand to withstand the heat of melt without showing any sign of softening is called as _____.
a) Refractoriness b) Forming
c) Machining d) Welding
- 2) Carburetor body is manufactured by _____.
a) Die Casting b) Centrifugal casting
c) Investment casting d) Any one of above
- 3) Hot chamber die casting process cannot be used _____.
a) Higher melting point metals
b) Lower melting point metal
c) Medium melting point metals
d) Non ferrous metal
- 4) The other name for investment casting is _____.
a) Lost - wax process b) Wax process
c) C process d) Waxing process
- 5) Which if the following materials has more shrinkage allowance?
a) Cast iron b) Brass
c) Lead d) Aluminum alloy
- 6) Spot welding comes under the _____ process
a) Arc welding b) Gas welding
c) Resistance welding d) Solid welding
- 7) For joining of two parts without use of extra filler material following processes are used _____.
a) Brazing b) TIG Welding
c) MIG Welding d) Resistance Welding
- 8) In _____ process molten metal is used to produce the products.
a) Casting b) Forming
c) Machining d) Welding

- 9) From following, the alternative name for RP is _____.
a) Additive Manufacturing b) Layer Manufacturing
c) Direct CAD Manufacturing d) All of the above
- 10) Slag inclusion in casting is a _____.
a) Surface defect b) Internal defect
c) Crack d) Notch
- 11) In four high rolling mill the bigger rollers are called _____.
a) Guide rolls b) Backup rolls
c) Main rolls d) Support rolls
- 12) In which type of extrusion process, the movement of the extruded is in the direction opposite to that of the deformed force?
a) direct b) forward
c) back ward d) die extrusion
- 13) The following welding process uses consumable electrode.
a) TIG b) MIG
c) Thermit d) Laser
- 14) Which of the following components is mainly manufactured by performing metal forging?
a) Piston b) Engine Block
c) Connecting Rod d) Crankcase

Seat No.	
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Set P

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**MECHANICAL ENGINEERING****Manufacturing Processes (BTN02303)**

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from both sections.
 2) Figures to the right indicate full marks.
 3) Make suitable assumption, if required and state them clearly.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Define Pattern and explain any Three types of Pattern. | 05 |
| | b) Explain with neat sketch Gating System. | 05 |
| | c) Define Core box and explain any two types of Core boxes. | 04 |
| Q.3 | a) Explain construction and Working of Cupola Furnace. | 05 |
| | b) Explain Investment Casting Process. | 05 |
| | c) Explain any three Casting defects. | 04 |
| Q.4 | a) Explain Arc welding in details. | 05 |
| | b) Differentiate clearly between TIG and MIG. | 05 |
| | c) Explain Brazing Process. | 04 |

Section – II

- | | | |
|------------|---|-----------|
| Q.5 | a) Define Rolling and Explain Two high rolling mills and Three high rolling mills. | 05 |
| | b) Difference between Hot roiling and Cold Rolling. | 05 |
| | c) Explain Open die forging and Closed die forging. | 04 |
| Q.6 | a) Explain Explosive Forming Process. | 05 |
| | b) Explain Magnetic Pulse forming Process. | 05 |
| | c) Explain Hydro forming Process. | 04 |
| Q.7 | a) Write advantages disadvantages and applications of Rapid Prototyping. | 05 |
| | b) Explain with neat sketch Direct metal laser sintering (DMLS). | 05 |
| | c) Explain Selective Laser Sintering (SLS). | 04 |

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Manufacturing Processes (BTN02303)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Make suitable assumptions, if required and state them clearly.

Marks: 14

14

- 1) In _____ process molten metal is used to produce the products.
a) Casting b) Forming
c) Machining d) Welding
- 2) From following, the alternative name for RP is _____.
a) Additive Manufacturing b) Layer Manufacturing
c) Direct CAD Manufacturing d) All of the above
- 3) Slag inclusion in casting is a _____.
a) Surface defect b) Internal defect
c) Crack d) Notch
- 4) In four high rolling mill the bigger rollers are called _____.
a) Guide rolls b) Backup rolls
c) Main rolls d) Support rolls
- 5) In which type of extrusion process, the movement of the extruded is in the direction opposite to that of the deformed force?
a) direct b) forward
c) back ward d) die extrusion
- 6) The following welding process uses consumable electrode.
a) TIG b) MIG
c) Thermit d) Laser
- 7) Which of the following components is mainly manufactured by performing metal forging?
a) Piston b) Engine Block
c) Connecting Rod d) Crankcase
- 8) The ability of the moulding sand to withstand the heat of melt without showing any sign of softening is called as _____.
a) Refractoriness b) Forming
c) Machining d) Welding

Seat No.	
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Set Q**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024****MECHANICAL ENGINEERING****Manufacturing Processes (BTN02303)**

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from both sections.
 2) Figures to the right indicate full marks.
 3) Make suitable assumption, if required and state them clearly.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Define Pattern and explain any Three types of Pattern. | 05 |
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| Q.3 | a) Explain construction and Working of Cupola Furnace. | 05 |
| | b) Explain Investment Casting Process. | 05 |
| | c) Explain any three Casting defects. | 04 |
| Q.4 | a) Explain Arc welding in details. | 05 |
| | b) Differentiate clearly between TIG and MIG. | 05 |
| | c) Explain Brazing Process. | 04 |

Section – II

- | | | |
|------------|---|-----------|
| Q.5 | a) Define Rolling and Explain Two high rolling mills and Three high rolling mills. | 05 |
| | b) Difference between Hot rolling and Cold Rolling. | 05 |
| | c) Explain Open die forging and Closed die forging. | 04 |
| Q.6 | a) Explain Explosive Forming Process. | 05 |
| | b) Explain Magnetic Pulse forming Process. | 05 |
| | c) Explain Hydro forming Process. | 04 |
| Q.7 | a) Write advantages disadvantages and applications of Rapid Prototyping. | 05 |
| | b) Explain with neat sketch Direct metal laser sintering (DMLS). | 05 |
| | c) Explain Selective Laser Sintering (SLS). | 04 |

R

Max. Marks: 70

Marks: 14

14

- Page 7 of 12

Seat No.	
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Set R**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024****MECHANICAL ENGINEERING****Manufacturing Processes (BTN02303)**

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from both sections.
 2) Figures to the right indicate full marks.
 3) Make suitable assumption, if required and state them clearly.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Define Pattern and explain any Three types of Pattern. | 05 |
| | b) Explain with neat sketch Gating System. | 05 |
| | c) Define Core box and explain any two types of Core boxes. | 04 |
| Q.3 | a) Explain construction and Working of Cupola Furnace. | 05 |
| | b) Explain Investment Casting Process. | 05 |
| | c) Explain any three Casting defects. | 04 |
| Q.4 | a) Explain Arc welding in details. | 05 |
| | b) Differentiate clearly between TIG and MIG. | 05 |
| | c) Explain Brazing Process. | 04 |

Section – II

- | | | |
|------------|---|-----------|
| Q.5 | a) Define Rolling and Explain Two high rolling mills and Three high rolling mills. | 05 |
| | b) Difference between Hot roiling and Cold Rolling. | 05 |
| | c) Explain Open die forging and Closed die forging. | 04 |
| Q.6 | a) Explain Explosive Forming Process. | 05 |
| | b) Explain Magnetic Pulse forming Process. | 05 |
| | c) Explain Hydro forming Process. | 04 |
| Q.7 | a) Write advantages disadvantages and applications of Rapid Prototyping. | 05 |
| | b) Explain with neat sketch Direct metal laser sintering (DMLS). | 05 |
| | c) Explain Selective Laser Sintering (SLS). | 04 |

Seat No.	
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Set	S
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Manufacturing Processes (BTN02303)

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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 3) Figures to the right indicates full marks.
 4) Make suitable assumptions, if required and state them clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Objective questions with one correct answer.

14

- 1) Spot welding comes under the _____ process
 - a) Arc welding
 - b) Gas welding
 - c) Resistance welding
 - d) Solid welding
- 2) For joining of two parts without use of extra filler material following processes are used _____.
 - a) Brazing
 - b) TIG Welding
 - c) MIG Welding
 - d) Resistance Welding
- 3) In _____ process molten metal is used to produce the products.
 - a) Casting
 - b) Forming
 - c) Machining
 - d) Welding
- 4) From following, the alternative name for RP is _____.
 - a) Additive Manufacturing
 - b) Layer Manufacturing
 - c) Direct CAD Manufacturing
 - d) All of the above
- 5) Slag inclusion in casting is a _____.
 - a) Surface defect
 - b) Internal defect
 - c) Crack
 - d) Notch
- 6) In four high rolling mill the bigger rollers are called _____.
 - a) Guide rolls
 - b) Backup rolls
 - c) Main rolls
 - d) Support rolls
- 7) In which type of extrusion process, the movement of the extruded is in the direction opposite to that of the deformed force?
 - a) direct
 - b) forward
 - c) back ward
 - d) die extrusion
- 8) The following welding process uses consumable electrode.
 - a) TIG
 - b) MIG
 - c) Thermit
 - d) Laser

- 9) Which of the following components is mainly manufactured by performing metal forging?
- | | |
|-------------------|-----------------|
| a) Piston | b) Engine Block |
| c) Connecting Rod | d) Crankcase |
- 10) The ability of the moulding sand to withstand the heat of melt without showing any sign of softening is called as ____.
- | | |
|-------------------|------------|
| a) Refractoriness | b) Forming |
| c) Machining | d) Welding |
- 11) Carburetor body is manufactured by ____.
- | | |
|-----------------------|------------------------|
| a) Die Casting | b) Centrifugal casting |
| c) Investment casting | d) Any one of above |
- 12) Hot chamber die casting process cannot be used ____.
- | | |
|--------------------------------|------------------------------|
| a) Higher melting point metals | b) Lower melting point metal |
| c) Medium melting point metals | d) Non ferrous metal |
- 13) The other name for investment casting is ____.
- | | |
|-----------------------|-------------------|
| a) Lost - wax process | b) Wax process |
| c) C process | d) Waxing process |
- 14) Which if the following materials has more shrinkage allowance?
- | | |
|--------------|-------------------|
| a) Cast iron | b) Brass |
| c) Lead | d) Aluminum alloy |

Seat No.	
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Set S**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024****MECHANICAL ENGINEERING****Manufacturing Processes (BTN02303)**

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from both sections.
 2) Figures to the right indicate full marks.
 3) Make suitable assumption, if required and state them clearly.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Define Pattern and explain any Three types of Pattern. | 05 |
| | b) Explain with neat sketch Gating System. | 05 |
| | c) Define Core box and explain any two types of Core boxes. | 04 |
| Q.3 | a) Explain construction and Working of Cupola Furnace. | 05 |
| | b) Explain Investment Casting Process. | 05 |
| | c) Explain any three Casting defects. | 04 |
| Q.4 | a) Explain Arc welding in details. | 05 |
| | b) Differentiate clearly between TIG and MIG. | 05 |
| | c) Explain Brazing Process. | 04 |

Section – II

- | | | |
|------------|---|-----------|
| Q.5 | a) Define Rolling and Explain Two high rolling mills and Three high rolling mills. | 05 |
| | b) Difference between Hot roiling and Cold Rolling. | 05 |
| | c) Explain Open die forging and Closed die forging. | 04 |
| Q.6 | a) Explain Explosive Forming Process. | 05 |
| | b) Explain Magnetic Pulse forming Process. | 05 |
| | c) Explain Hydro forming Process. | 04 |
| Q.7 | a) Write advantages disadvantages and applications of Rapid Prototyping. | 05 |
| | b) Explain with neat sketch Direct metal laser sintering (DMLS). | 05 |
| | c) Explain Selective Laser Sintering (SLS). | 04 |

Seat No.	
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Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Use first angle Method of projections.
- 5) Assume suitable dimensions if not given.

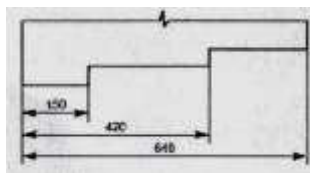
Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) In hole basis system the lower deviation of hole is _____.
a) Zero
b) Varying
c) More than zero
d) None of the above
- 2) Standard size for A2 drawing sheet as per BIS in mm is _____.
a) 594x841
b) 297x420
c) 210x297
d) 420x594
- 3) The algebraic difference between the maximum limit of size and corresponding basic size is _____.
a) Fit
b) Lower deviation
c) Upper deviation
d) allowance
- 4) Included angle of worm thread is _____.
a) 55°
b) 29°
c) 60°
d) 90°



is an example of _____.

- a) Parallel dimension b) Chain dimension
c) Oblique dimension d) None of the above
- 6) _____ nuts are used in smoke boxes or locomotive and steam pipe connections.
a) Cap b) Ring
c) Castle d) Hexagonal
- 7) || is symbol used for _____ weld.
a) Square butt b) V butt
c) U butt d) Bevel butt
- 8) Both left and right-hand threads are used in _____.
a) Coupler nut b) Castle nut
c) Wing nut d) Ring nut

- 9) In the process of welding, SAW stands for
a) Sub-merged arc welding b) Surface arc welding
c) Super arc welding d) Simple arc welding
- 10) The plates are bevelled in _____ joint.
a) Butt b) Lap
c) Both A and B d) None of the above
- 11) The geometrical characteristics of a surface include
a) Macro-deviations b) Surface waviness
c) Micro-irregularities d) All of the above
- 12) _____ neck is used to prevent the rotation of the bolt.
a) Square b) Round
c) Trapezoidal d) Oval
- 13) In solid flange coupling, the flanges are joined by means of
a) Hex. head bolts b) Headless taper bolts
c) Cotter pin d) Rivets
- 14) Journal bearings can support only
a) Axial loads b) Radial loads
c) Inclined loads d) None of the above

Seat
No.Set **P**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING**Machine Drawing & CAD (BTN02304)**

Day & Date: Thursday, 16-05-2024

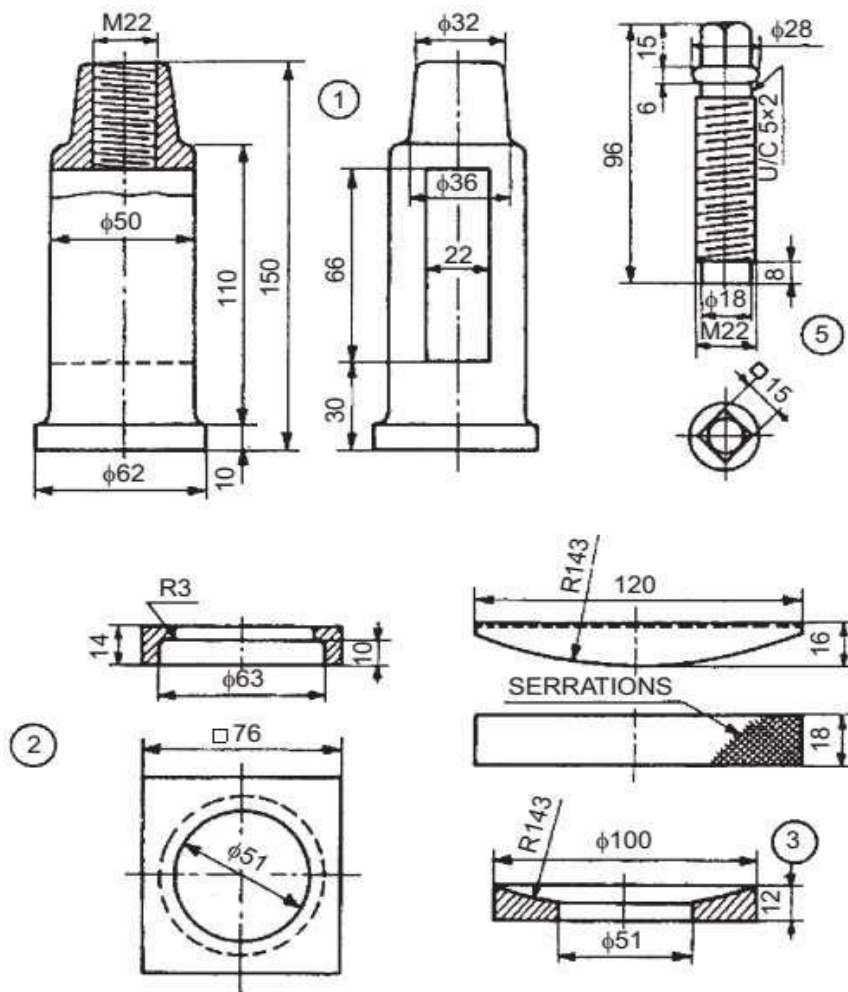
Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 2 are compulsory and out of question no.3 to 5, attempt any two.
 2) Assume suitable dimensions if not given.
 3) Use first angle Method of projections.
 4) Figures to the right indicate full marks.

Q.2 Figure below shows the details of single tool post. Assemble the given parts and draw: **24**

- 1) Front View
 2) Side View Prepare bill of material and give all the dimensions.



Parts list

No.	Name	Matl	Qty
1	Pillar	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

Q.3 Solve any Four out of five. (Every bit has 02 marks)

- a) Draw BIS Convention of
 - i) diamond knurling
 - ii) bearings
- b) Draw Free Hand Sketch of
 - i) Single riveted single strap butt joint
 - ii) Double riveted single strap lap joint
- c) Draw BIS Conventions of
 - i) splined shaft and serrated shaft
 - ii) single butt weld
- d) Draw Free Hand Sketch of
 - i) ACME thread
 - ii) protected flanged nut
- e) Draw BIS Conventions of
 - i) asbestos
 - ii) white metal

Q.4 Solve any Four out of five. (Every bit has 04 marks)

16

- a) Draw BIS Conventions of worm and worm wheel (Both view).
- b) Draw Free Hand Sketch of knuckle joint.
- c) Draw BIS Conventions for ratchet and pinion.
- d) Draw Free Hand Sketch of rag foundation bolt.
- e) Draw Free Hand Sketch Double riveted zig-zag joint.

Q.5 Solve the Following

- a) Identify the type of fit indicated with following fit designation
 - i) $\phi 35H8g7$
 - ii) $\phi 45H6n6$

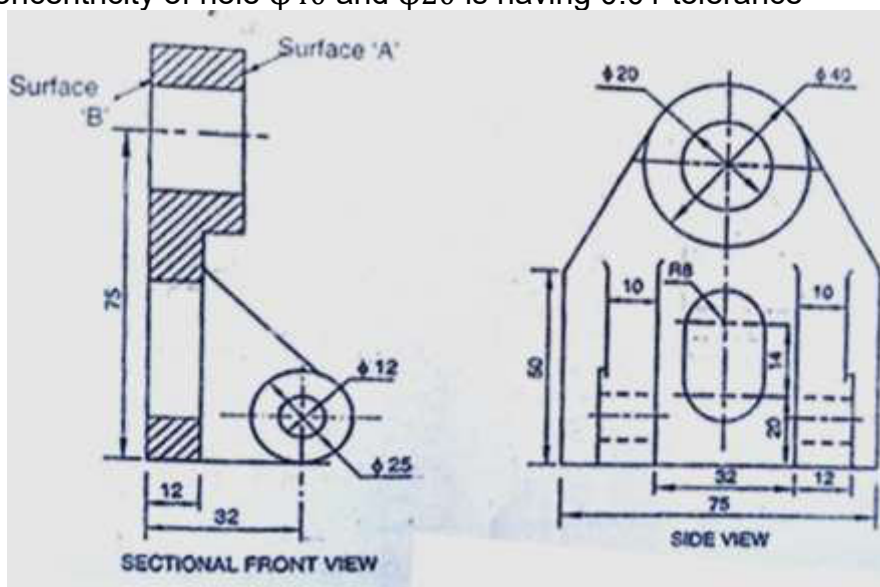
08

Also support the answer by writing the calculations and draw diagram for the same.

- b) Redraw the given views of the machine component shown below and indicate following items on it.

08

- i) axis of $\phi 40$ is perpendicular to surface B within 0.02
- ii) Circularity of $\phi 12$ is within 0.02 mm
- iii) Surface A and surface B are parallel within 0.01 mm
- iv) Concentricity of hole $\phi 40$ and $\phi 20$ is having 0.01 tolerance



Diameter steps in mm		Tolerance Grades																	
		01	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14*	15*	16*
To and inc	3	0.3	0.5	0.8	1.2	2	3	4	6	10	14	25	40	60	100	140	250	400	600
Over	3																		
To and inc	6	0.4	0.6	1	1.5	2.5	4	5	8	12	18	30	48	75	120	180	300	480	750
Over	6																		
To and inc	10	0.4	0.6	1	1.5	2.5	4	6	9	15	22	36	58	90	150	220	360	580	900
Over	10																		
To and inc	18	0.5	0.8	1.2	2	3	5	8	11	18	27	43	70	110	180	270	430	700	1100
Over	18																		
To and inc	30	0.6	1	1.5	2.5	4	6	9	13	21	33	52	84	130	210	330	530	840	1300
Over	30																		
To and inc	50	0.6	1	1.5	2.5	4	7	11	16	25	39	62	100	160	250	390	620	1000	1600
Over	50																		
To and inc	80	0.8	1.2	2	3	5	8	13	19	30	46	74	120	190	300	460	740	1200	1900
Over	80																		
To and inc	120	1	1.5	2.5	4	6	10	15	22	35	54	87	140	220	350	540	870	1400	2200
Over	120																		
To and inc	180	1.2	2	3.5	5	8	12	18	25	40	63	100	160	250	400	630	1000	1600	2500
Over	180																		
To and inc	250	2	3	4.5	7	10	14	20	29	46	72	115	185	290	460	720	1150	1850	2900
Over	250																		
To and inc	315	2.5	4	6	8	12	16	23	32	52	81	130	210	320	520	810	1300	2100	3200
Over	315																		
To and inc	400	3	5	7	9	13	18	25	36	57	89	140	230	360	570	890	1400	2300	3600
Over	400																		
To and inc	500	4	6	8	10	15	20	27	40	63	97	155	250	400	630	970	1550	2500	4000
Over	500																		

*Upto 1 mm, Grades 14 to 16 are not provided.

Fundamental deviation in microns										(1 micron = 0.001 mm)					
Diameter steps in mm		Upper deviation (es)								js*	Lower deviation (ei)				
a	b	c	d	e	f	g	h	j	k						
over	upto	All grades								± IT/2	5.6	7	8	4 to 7	≤ 3, > 7
—	*3	-270	-140	-60	-20	-14	-6	-2	0		-2	-4	-6	-0	-0
3	6	-270	-140	-70	-30	-20	-10	-4	0		-2	-4	—	+1	0
6	10	-280	-150	-80	-40	-25	-13	-5	0		-2	-5	—	+1	0
10	14	-290	-150	-95	-50	-32	-16	-6	0		-3	-6	—	+1	0
14	18														
18	24	-300	-160	-110	-65	-40	-20	-7	0		-4	-8	—	+2	0
24	30														
30	40	-310	-170	-120	-80	-50	-25	-9	0	-5	-10	—	+2	0	
40	50	-320	-180	-130	-90	-60	-30	-10	0						
50	65	-340	-190	-140	-100	-60	-30	-10	0	-7	-12	—	+2	0	
65	80	-360	-200	-150	-120	-70	-36	-12	0	-9	-15	—	+3	0	
80	100	-380	-220	-170	-120	-72	-36	-12	0						
100	120	-410	-240	-180	-145	-85	-43	-14	0	-11	-18	—	+3	0	
120	140	-460	-260	-200											
140	160	-520	-280	-210											
160	180	-580	-310	-230											

Fundamental deviation in microns															(1 micron = 0.001 mm)				
Diameter steps in mm		Lower deviations (ei)																	
		m	n	p	r	s	t	u	v	x	y	z	za	zb	zc				
Over	Upto	All grades																	
—	3	+ 2	+ 4	+ 6	+ 10	+ 14	—	+ 18	—	+ 20	—	+ 26	+ 32	+ 40	+ 60				
3	6	+ 4	+ 8	+ 12	+ 15	+ 19	—	+ 23	—	+ 28	—	+ 35	+ 42	+ 50	+ 80				
6	10	+ 6	+ 10	+ 15	+ 19	+ 23	—	+ 28	—	+ 34	—	+ 42	+ 52	+ 67	+ 97				
10	14	+ 7	+ 12	+ 18	+ 23	+ 28	—	+ 33	—	+ 40	—	+ 50	+ 64	+ 90	+ 130				
14	18									+ 39	+ 45	—	+ 60	+ 77	+ 108	+ 150			
18	24	+ 8	+ 15	+ 22	+ 28	+ 35	—	+ 41	+ 47	+ 54	+ 63	+ 73	+ 98	+ 136	+ 188				
24	30							+ 41	+ 48	+ 55	+ 64	+ 75	+ 98	+ 136	+ 188	+ 240			
30	40	+ 9	+ 17	+ 26	+ 34	+ 43		+ 48	+ 60	+ 68	+ 80	+ 94	+ 112	+ 148	+ 200	+ 274			
40	50							+ 54	+ 70	+ 81	+ 97	+ 114	+ 136	+ 180	+ 242	+ 325			
50	65	+ 11	+ 20	+ 32	+ 41	+ 53	+ 66	+ 87	+ 102	+ 122	+ 144	+ 172	+ 226	+ 300	+ 405				
65	80				+ 43	+ 59	+ 75	+ 102	+ 120	+ 146	+ 174	+ 210	+ 274	+ 360	+ 480				
80	100	+ 13	+ 23	+ 37	+ 51	+ 71	+ 91	+ 124	+ 146	+ 178	+ 214	+ 258	+ 335	+ 445	+ 585				
100	120				+ 54	+ 79	+ 104	+ 144	+ 172	+ 210	+ 254	+ 310	+ 400	+ 525	+ 690				
120	140				+ 63	+ 92	+ 122	+ 170	+ 202	+ 248	+ 300	+ 365	+ 470	+ 620	+ 800				
140	160	+ 15	+ 27	+ 43	+ 65	+ 100	+ 134	+ 190	+ 228	+ 280	+ 340	+ 415	+ 535	+ 700	+ 900				
160	180				+ 68	+ 108	+ 146	+ 210	+ 252	+ 310	+ 380	+ 465	+ 600	+ 780	+ 1000				

Seat No.	
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Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Use first angle Method of projections.
- 5) Assume suitable dimensions if not given.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) Both left and right-hand threads are used in _____.
a) Coupler nut b) Castle nut
c) Wing nut d) Ring nut
- 2) In the process of welding, SAW stands for
a) Sub-merged arc welding b) Surface arc welding
c) Super arc welding d) Simple arc welding
- 3) The plates are bevelled in _____ joint.
a) Butt b) Lap
c) Both A and B d) None of the above
- 4) The geometrical characteristics of a surface include
a) Macro-deviations b) Surface waviness
c) Micro-irregularities d) All of the above
- 5) _____ neck is used to prevent the rotation of the bolt.
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- 6) In solid flange coupling, the flanges are joined by means of
a) Hex. head bolts b) Headless taper bolts
c) Cotter pin d) Rivets
- 7) Journal bearings can support only
a) Axial loads b) Radial loads
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- 8) In hole basis system the lower deviation of hole is _____.
a) Zero b) Varying
c) More than zero d) None of the above
- 9) Standard size for A2 drawing sheet as per BIS in mm is _____.
a) 594x841 b) 297x420
c) 210x297 d) 420x594

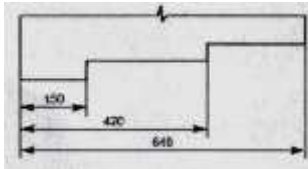
10) The algebraic difference between the maximum limit of size and corresponding basic size is _____.

- | | |
|--------------------|--------------------|
| a) Fit | b) Lower deviation |
| c) Upper deviation | d) allowance |

11) Included angle of worm thread is _____.

- | | |
|---------------|---------------|
| a) 55° | b) 29° |
| c) 60° | d) 90° |

12)



is an example of _____.

- | | |
|-----------------------|----------------------|
| a) Parallel dimension | b) Chain dimension |
| c) Oblique dimension | d) None of the above |

13) _____ nuts are used in smoke boxes or locomotive and steam pipe connections.

- | | |
|-----------|--------------|
| a) Cap | b) Ring |
| c) Castle | d) Hexagonal |

14) || is symbol used for _____ weld.

- | | |
|----------------|---------------|
| a) Square butt | b) V butt |
| c) U butt | d) Bevel butt |

Seat
No.Set **Q**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING**Machine Drawing & CAD (BTN02304)**

Day & Date: Thursday, 16-05-2024

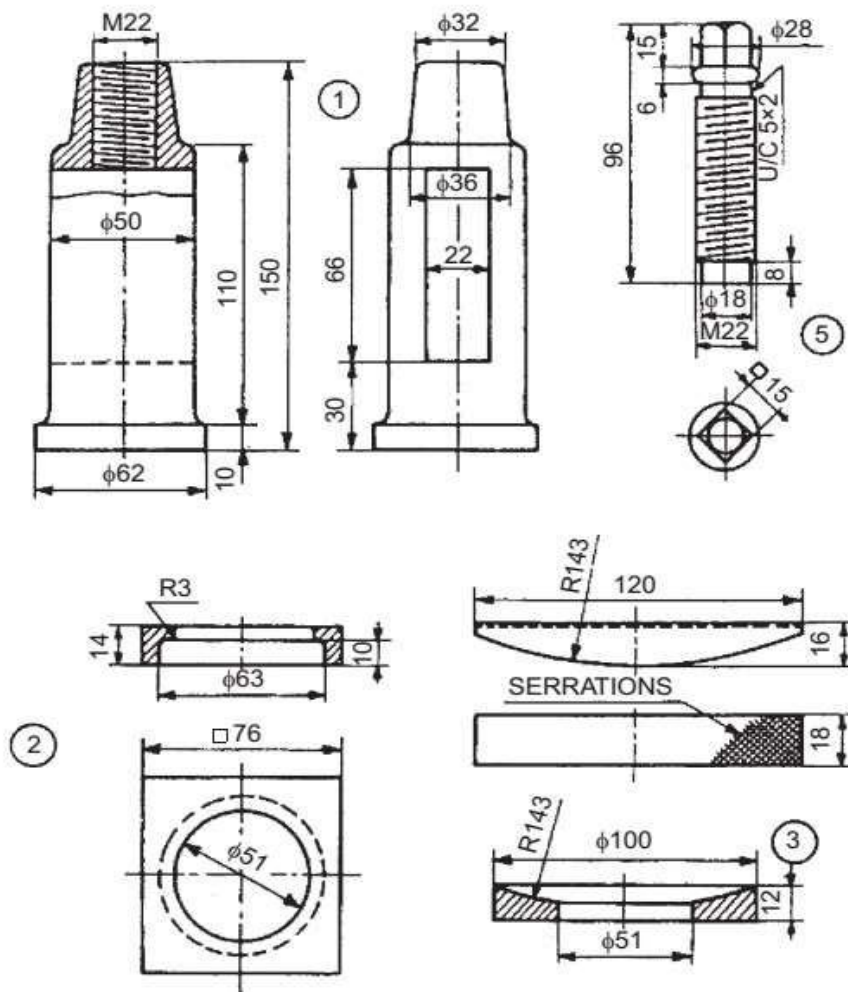
Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 2 are compulsory and out of question no.3 to 5, attempt any two.
 2) Assume suitable dimensions if not given.
 3) Use first angle Method of projections.
 4) Figures to the right indicate full marks.

Q.2 Figure below shows the details of single tool post. Assemble the given parts and draw: **24**

- 1) Front View
 2) Side View Prepare bill of material and give all the dimensions.



Parts list

No.	Name	Matl	Qty
1	Pillar	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

Q.3 Solve any Four out of five. (Every bit has 02 marks)

- Draw BIS Convention of
 - diamond knurling
 - bearings
- Draw Free Hand Sketch of
 - Single riveted single strap butt joint
 - Double riveted single strap lap joint
- Draw BIS Conventions of
 - splined shaft and serrated shaft
 - single butt weld
- Draw Free Hand Sketch of
 - ACME thread
 - protected flanged nut
- Draw BIS Conventions of
 - asbestos
 - white metal

Q.4 Solve any Four out of five. (Every bit has 04 marks)

16

- Draw BIS Conventions of worm and worm wheel (Both view).
- Draw Free Hand Sketch of knuckle joint.
- Draw BIS Conventions for ratchet and pinion.
- Draw Free Hand Sketch of rag foundation bolt.
- Draw Free Hand Sketch Double riveted zig-zag joint.

Q.5 Solve the Following

- Identify the type of fit indicated with following fit designation
 - $\phi 35H8g7$
 - $\phi 45H6n6$

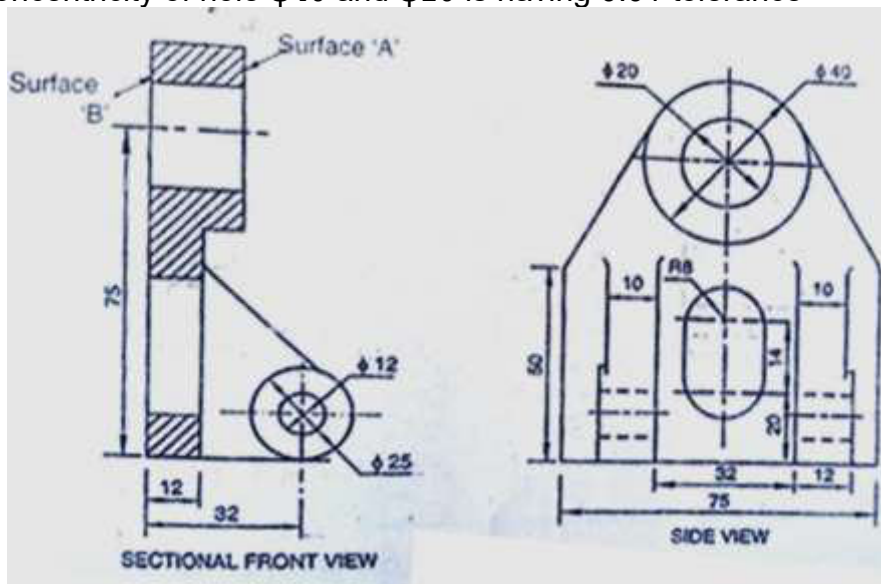
08

Also support the answer by writing the calculations and draw diagram for the same.

- Redraw the given views of the machine component shown below and indicate following items on it.

08

- axis of $\phi 40$ is perpendicular to surface B within 0.02
- Circularity of $\phi 12$ is within 0.02 mm
- Surface A and surface B are parallel within 0.01 mm
- Concentricity of hole $\phi 40$ and $\phi 20$ is having 0.01 tolerance



Diameter steps in mm		Tolerance Grades																	
		01	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14*	15*	16*
To and inc	3	0.3	0.5	0.8	1.2	2	3	4	6	10	14	25	40	60	100	140	250	400	600
Over	3																		
To and inc	6	0.4	0.6	1	1.5	2.5	4	5	8	12	18	30	48	75	120	180	300	480	750
Over	6																		
To and inc	10	0.4	0.6	1	1.5	2.5	4	6	9	15	22	36	58	90	150	220	360	580	900
Over	10																		
To and inc	18	0.5	0.8	1.2	2	3	5	8	11	18	27	43	70	110	180	270	430	700	1100
Over	18																		
To and inc	30	0.6	1	1.5	2.5	4	6	9	13	21	33	52	84	130	210	330	520	840	1300
Over	30																		
To and inc	50	0.6	1	1.5	2.5	4	7	11	16	25	39	62	100	160	250	390	620	1000	1600
Over	50																		
To and inc	80	0.8	1.2	2	3	5	8	13	19	30	46	74	120	190	300	460	740	1200	1900
Over	80																		
To and inc	120	1	1.5	2.5	4	6	10	15	22	35	54	87	140	220	350	540	870	1400	2200
Over	120																		
To and inc	180	1.2	2	3.5	5	8	12	18	25	40	63	100	160	250	400	630	1000	1600	2500
Over	180																		
To and inc	250	2	3	4.5	7	10	14	20	29	46	72	115	185	290	460	720	1150	1850	2900
Over	250																		
To and inc	315	2.5	4	6	8	12	16	23	32	52	81	130	210	320	520	810	1300	2100	3200
Over	315																		
To and inc	400	3	5	7	9	13	18	25	36	57	89	140	230	360	570	890	1400	2300	3600
Over	400																		
To and inc	500	4	6	8	10	15	20	27	40	63	97	155	250	400	630	970	1550	2500	4000

*Upto 1 mm, Grades 14 to 16 are not provided.

Fundamental deviation in microns										(1 micron = 0.001 mm)					
Diameter steps in mm		Upper deviation (es)								js*	Lower deviation (ei)				
a	b	c	d	e	f	g	h	j	k						
over	upto	All grades								± IT/2	5.6	7	8	4 to 7	≤ 3, > 7
—	*3	-270	-140	-60	-20	-14	-6	-2	0		-2	-4	-6	-0	-0
3	6	-270	-140	-70	-30	-20	-10	-4	0		-2	-4	—	+1	0
6	10	-280	-150	-80	-40	-25	-13	-5	0		-2	-5	—	+1	0
10	14	-290	-150	-95	-50	-32	-16	-6	0		-3	-6	—	+1	0
14	18														
18	24	-300	-160	-110	-65	-40	-20	-7	0		-4	-8	—	+2	0
24	30														
30	40	-310	-170	-120	-80	-50	-25	-9	0	-5	-10	—	+2	0	
40	50	-320	-180	-130	-90	-60	-30	-10	0						
50	65	-340	-190	-140	-100	-60	-30	-10	0	-7	-12	—	+2	0	
65	80	-360	-200	-150	-120	-70	-36	-12	0	-9	-15	—	+3	0	
80	100	-380	-220	-170	-120	-72	-36	-12	0						
100	120	-410	-240	-180	-145	-85	-43	-14	0	-11	-18	—	+3	0	
120	140	-460	-260	-200											
140	160	-520	-280	-210											
160	180	-580	-310	-230											

Fundamental deviation in microns															(1 micron = 0.001 mm)				
Diameter steps in mm		Lower deviations (ei)																	
		m	n	p	r	s	t	u	v	x	y	z	za	zb	zc				
Over	Upto	All grades																	
—	3	+ 2	+ 4	+ 6	+ 10	+ 14	—	+ 18	—	+ 20	—	+ 26	+ 32	+ 40	+ 60				
3	6	+ 4	+ 8	+ 12	+ 15	+ 19	—	+ 23	—	+ 28	—	+ 35	+ 42	+ 50	+ 80				
6	10	+ 6	+ 10	+ 15	+ 19	+ 23	—	+ 28	—	+ 34	—	+ 42	+ 52	+ 67	+ 97				
10	14	+ 7	+ 12	+ 18	+ 23	+ 28	—	+ 33	—	+ 40	—	+ 50	+ 64	+ 90	+ 130				
14	18									+ 39	+ 45	—	+ 60	+ 77	+ 108	+ 150			
18	24	+ 8	+ 15	+ 22	+ 28	+ 35	—	+ 41	+ 47	+ 54	+ 63	+ 73	+ 98	+ 136	+ 188				
24	30							+ 41	+ 48	+ 55	+ 64	+ 75	+ 98	+ 136	+ 188	+ 240			
30	40	+ 9	+ 17	+ 26	+ 34	+ 43		+ 48	+ 60	+ 68	+ 80	+ 94	+ 112	+ 148	+ 200	+ 274			
40	50							+ 54	+ 70	+ 81	+ 97	+ 114	+ 136	+ 180	+ 242	+ 325			
50	65	+ 11	+ 20	+ 32	+ 41	+ 53	+ 66	+ 87	+ 102	+ 122	+ 144	+ 172	+ 226	+ 300	+ 405				
65	80				+ 43	+ 59	+ 75	+ 102	+ 120	+ 146	+ 174	+ 210	+ 274	+ 360	+ 480				
80	100	+ 13	+ 23	+ 37	+ 51	+ 71	+ 91	+ 124	+ 146	+ 178	+ 214	+ 258	+ 335	+ 445	+ 585				
100	120				+ 54	+ 79	+ 104	+ 144	+ 172	+ 210	+ 254	+ 310	+ 400	+ 525	+ 690				
120	140				+ 63	+ 92	+ 122	+ 170	+ 202	+ 248	+ 300	+ 365	+ 470	+ 620	+ 800				
140	160	+ 15	+ 27	+ 43	+ 65	+ 100	+ 134	+ 190	+ 228	+ 280	+ 340	+ 415	+ 535	+ 700	+ 900				
160	180				+ 68	+ 108	+ 146	+ 210	+ 252	+ 310	+ 380	+ 465	+ 600	+ 780	+ 1000				

Seat No.	
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Set	R
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Machine Drawing & CAD (BTN02304)

Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
 - 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 - 3) Figures to the right indicates full marks.
 - 4) Use first angle Method of projections.
 - 5) Assume suitable dimensions if not given.

MCQ/Objective Type Questions

Duration: 30 Minutes

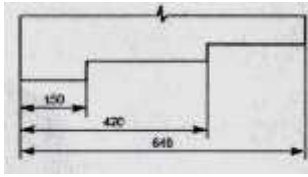
Marks: 14

Q.1 Choose the correct answer.

14

- 1) The geometrical characteristics of a surface include
 - a) Macro-deviations
 - b) Surface waviness
 - c) Micro-irregularities
 - d) All of the above
- 2) _____ neck is used to prevent the rotation of the bolt.
 - a) Square
 - b) Round
 - c) Trapezoidal
 - d) Oval
- 3) In solid flange coupling, the flanges are joined by means of
 - a) Hex. head bolts
 - b) Headless taper bolts
 - c) Cotter pin
 - d) Rivets
- 4) Journal bearings can support only
 - a) Axial loads
 - b) Radial loads
 - c) Inclined loads
 - d) None of the above
- 5) In hole basis system the lower deviation of hole is _____.
 - a) Zero
 - b) Varying
 - c) More than zero
 - d) None of the above
- 6) Standard size for A2 drawing sheet as per BIS in mm is _____.
 - a) 594x841
 - b) 297x420
 - c) 210x297
 - d) 420x594
- 7) The algebraic difference between the maximum limit of size and corresponding basic size is _____.
 - a) Fit
 - b) Lower deviation
 - c) Upper deviation
 - d) allowance
- 8) Included angle of worm thread is _____.
 - a) 55°
 - b) 29°
 - c) 60°
 - d) 90°

9)



is an example of _____.

- a) Parallel dimension b) Chain dimension
c) Oblique dimension d) None of the above
- 10) _____ nuts are used in smoke boxes or locomotive and steam pipe connections.
a) Cap b) Ring
c) Castle d) Hexagonal
- 11) || is symbol used for _____ weld.
a) Square butt b) V butt
c) U butt d) Bevel butt
- 12) Both left and right-hand threads are used in _____.
a) Coupler nut b) Castle nut
c) Wing nut d) Ring nut
- 13) In the process of welding, SAW stands for
a) Sub-merged arc welding b) Surface arc welding
c) Super arc welding d) Simple arc welding
- 14) The plates are bevelled in _____ joint.
a) Butt b) Lap
c) Both A and B d) None of the above

Seat
No.Set **R**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING**Machine Drawing & CAD (BTN02304)**

Day & Date: Thursday, 16-05-2024

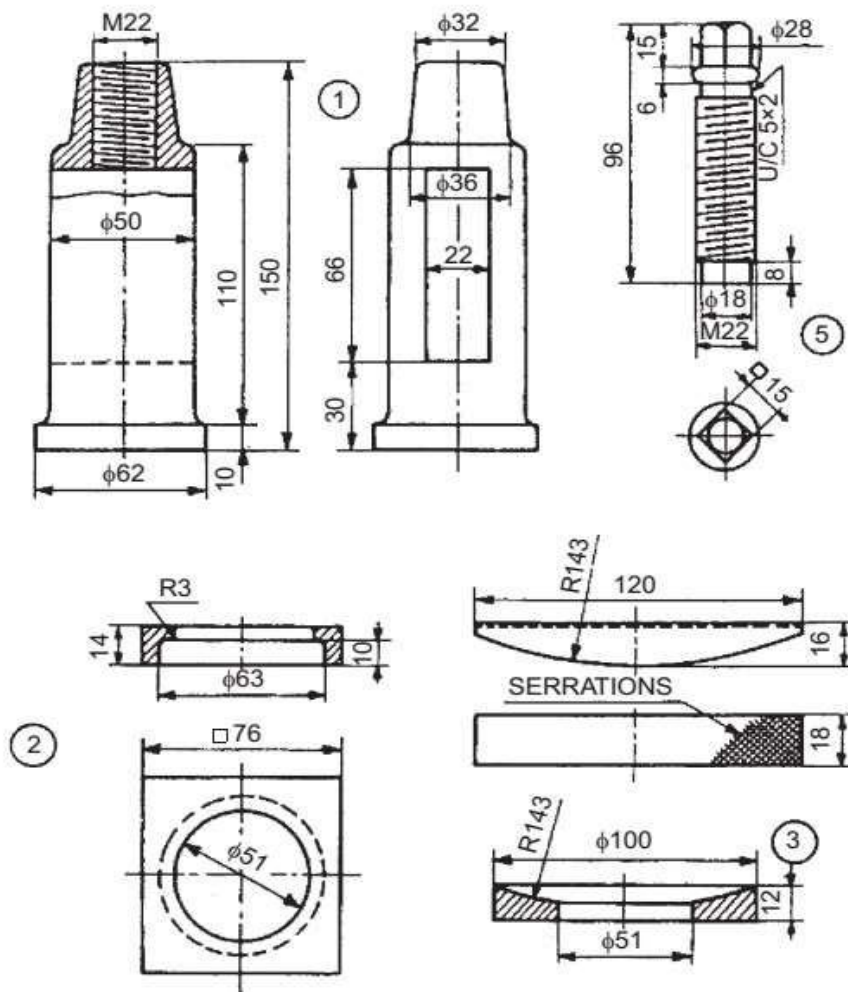
Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 2 are compulsory and out of question no.3 to 5, attempt any two.
 2) Assume suitable dimensions if not given.
 3) Use first angle Method of projections.
 4) Figures to the right indicate full marks.

Q.2 Figure below shows the details of single tool post. Assemble the given parts and draw: **24**

- 1) Front View
 2) Side View Prepare bill of material and give all the dimensions.



Parts list

No.	Name	Matl	Qty
1	Pillar	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

Q.3 Solve any Four out of five. (Every bit has 02 marks)

- a) Draw BIS Convention of
 - i) diamond knurling
 - ii) bearings
- b) Draw Free Hand Sketch of
 - i) Single riveted single strap butt joint
 - ii) Double riveted single strap lap joint
- c) Draw BIS Conventions of
 - i) splined shaft and serrated shaft
 - ii) single butt weld
- d) Draw Free Hand Sketch of
 - i) ACME thread
 - ii) protected flanged nut
- e) Draw BIS Conventions of
 - i) asbestos
 - ii) white metal

Q.4 Solve any Four out of five. (Every bit has 04 marks)

16

- a) Draw BIS Conventions of worm and worm wheel (Both view).
- b) Draw Free Hand Sketch of knuckle joint.
- c) Draw BIS Conventions for ratchet and pinion.
- d) Draw Free Hand Sketch of rag foundation bolt.
- e) Draw Free Hand Sketch Double riveted zig-zag joint.

Q.5 Solve the Following

- a) Identify the type of fit indicated with following fit designation
 - i) $\phi 35H8g7$
 - ii) $\phi 45H6n6$

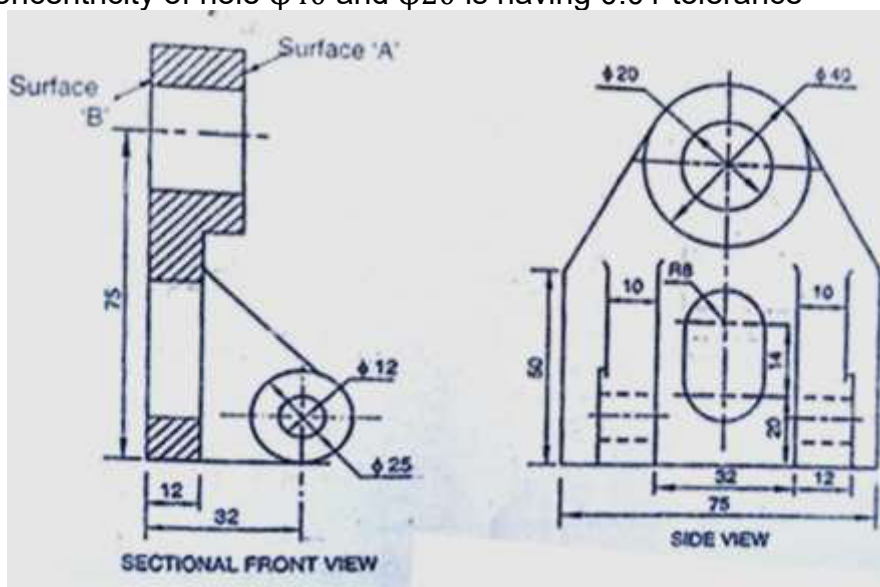
08

Also support the answer by writing the calculations and draw diagram for the same.

- b) Redraw the given views of the machine component shown below and indicate following items on it.

08

- i) axis of $\phi 40$ is perpendicular to surface B within 0.02
- ii) Circularity of $\phi 12$ is within 0.02 mm
- iii) Surface A and surface B are parallel within 0.01 mm
- iv) Concentricity of hole $\phi 40$ and $\phi 20$ is having 0.01 tolerance



Diameter steps in mm		Tolerance Grades																	
		01	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14*	15*	16*
To and inc	3	0.3	0.5	0.8	1.2	2	3	4	6	10	14	25	40	60	100	140	250	400	600
Over	3																		
To and inc	6	0.4	0.6	1	1.5	2.5	4	5	8	12	18	30	48	75	120	180	300	480	750
Over	6																		
To and inc	10	0.4	0.6	1	1.5	2.5	4	6	9	15	22	36	58	90	150	220	360	580	900
Over	10																		
To and inc	18	0.5	0.8	1.2	2	3	5	8	11	18	27	43	70	110	180	270	430	700	1100
Over	18																		
To and inc	30	0.6	1	1.5	2.5	4	6	9	13	21	33	52	84	130	210	330	520	840	1300
Over	30																		
To and inc	50	0.6	1	1.5	2.5	4	7	11	16	25	39	62	100	160	250	390	620	1000	1600
Over	50																		
To and inc	80	0.8	1.2	2	3	5	8	13	19	30	46	74	120	190	300	460	740	1200	1900
Over	80																		
To and inc	120	1	1.5	2.5	4	6	10	15	22	35	54	87	140	220	350	540	870	1400	2200
Over	120																		
To and inc	180	1.2	2	3.5	5	8	12	18	25	40	63	100	160	250	400	630	1000	1600	2500
Over	180																		
To and inc	250	2	3	4.5	7	10	14	20	29	46	72	115	185	290	460	720	1150	1850	2900
Over	250																		
To and inc	315	2.5	4	6	8	12	16	23	32	52	81	130	210	320	520	810	1300	2100	3200
Over	315																		
To and inc	400	3	5	7	9	13	18	25	36	57	89	140	230	360	570	890	1400	2300	3600
Over	400																		
To and inc	500	4	6	8	10	15	20	27	40	63	97	155	250	400	630	970	1550	2500	4000

*Upto 1 mm, Grades 14 to 16 are not provided.

Fundamental deviation in microns										(1 micron = 0.001 mm)					
Diameter steps in mm		Upper deviation (es)								js*	Lower deviation (ei)				
a	b	c	d	e	f	g	h	j	k						
over	upto	All grades								± IT/2	5.6	7	8	4 to 7	≤ 3, > 7
—	*3	- 270	- 140	- 60	- 20	- 14	- 6	- 2	0		- 2	- 4	- 6	- 0	- 0
3	6	- 270	- 140	- 70	- 30	- 20	- 10	- 4	0		- 2	- 4	—	+ 1	0
6	10	- 280	- 150	- 80	- 40	- 25	- 13	- 5	0		- 2	- 5	—	+ 1	0
10	14	- 290	- 150	- 95	- 50	- 32	- 16	- 6	0		- 3	- 6	—	+ 1	0
14	18														
18	24	- 300	- 160	- 110	- 65	- 40	- 20	- 7	0		- 4	- 8	—	+ 2	0
24	30														
30	40	- 310	- 170	- 120	- 80	- 50	- 25	- 9	0		- 5	- 10	—	+ 2	0
40	50	- 320	- 180	- 130											
50	65	- 340	- 190	- 140	- 100	- 60	- 30	- 10	0	- 7	- 12	—	+ 2	0	
65	80	- 360	- 200	- 150											
80	100	- 380	- 220	- 170	- 120	- 72	- 36	- 12	0	- 9	- 15	—	+ 3	0	
100	120	- 410	- 240	- 180											
120	140	- 460	- 260	- 200											
140	160	- 520	- 280	- 210	- 145	- 85	- 43	- 14	0	- 11	- 18	—	+ 3	0	
160	180	- 580	- 310	- 230											

Fundamental deviation in microns															(1 micron = 0.001 mm)				
Diameter steps in mm		Lower deviations (ei)																	
		m	n	p	r	s	t	u	v	x	y	z	za	zb	zc				
Over	Upto	All grades																	
—	3	+ 2	+ 4	+ 6	+ 10	+ 14	—	+ 18	—	+ 20	—	+ 26	+ 32	+ 40	+ 60				
3	6	+ 4	+ 8	+ 12	+ 15	+ 19	—	+ 23	—	+ 28	—	+ 35	+ 42	+ 50	+ 80				
6	10	+ 6	+ 10	+ 15	+ 19	+ 23	—	+ 28	—	+ 34	—	+ 42	+ 52	+ 67	+ 97				
10	14	+ 7	+ 12	+ 18	+ 23	+ 28	—	+ 33	—	+ 40	—	+ 50	+ 64	+ 90	+ 130				
14	18									+ 39	+ 45	—	+ 60	+ 77	+ 108	+ 150			
18	24	+ 8	+ 15	+ 22	+ 28	+ 35	—	+ 41	+ 47	+ 54	+ 63	+ 73	+ 98	+ 136	+ 188				
24	30							+ 41	+ 48	+ 55	+ 64	+ 75	+ 98	+ 136	+ 188	+ 240			
30	40	+ 9	+ 17	+ 26	+ 34	+ 43		+ 48	+ 60	+ 68	+ 80	+ 94	+ 112	+ 148	+ 200	+ 274			
40	50							+ 54	+ 70	+ 81	+ 97	+ 114	+ 136	+ 180	+ 242	+ 325			
50	65	+ 11	+ 20	+ 32	+ 41	+ 53	+ 66	+ 87	+ 102	+ 122	+ 144	+ 172	+ 226	+ 300	+ 405				
65	80				+ 43	+ 59	+ 75	+ 102	+ 120	+ 146	+ 174	+ 210	+ 274	+ 360	+ 480				
80	100	+ 13	+ 23	+ 37	+ 51	+ 71	+ 91	+ 124	+ 146	+ 178	+ 214	+ 258	+ 335	+ 445	+ 585				
100	120				+ 54	+ 79	+ 104	+ 144	+ 172	+ 210	+ 254	+ 310	+ 400	+ 525	+ 690				
120	140				+ 63	+ 92	+ 122	+ 170	+ 202	+ 248	+ 300	+ 365	+ 470	+ 620	+ 800				
140	160	+ 15	+ 27	+ 43	+ 65	+ 100	+ 134	+ 190	+ 228	+ 280	+ 340	+ 415	+ 535	+ 700	+ 900				
160	180				+ 68	+ 108	+ 146	+ 210	+ 252	+ 310	+ 380	+ 465	+ 600	+ 780	+ 1000				

Seat No.	
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Set	S
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING

Machine Drawing & CAD (BTN02304)

Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
 - 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 - 3) Figures to the right indicates full marks.
 - 4) Use first angle Method of projections.
 - 5) Assume suitable dimensions if not given.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct answer.

14

- 1) _____ nuts are used in smoke boxes or locomotive and steam pipe connections.
 - a) Cap
 - b) Ring
 - c) Castle
 - d) Hexagonal
- 2) || is symbol used for _____ weld.
 - a) Square butt
 - b) V butt
 - c) U butt
 - d) Bevel butt
- 3) Both left and right-hand threads are used in _____.
 - a) Coupler nut
 - b) Castle nut
 - c) Wing nut
 - d) Ring nut
- 4) In the process of welding, SAW stands for
 - a) Sub-merged arc welding
 - b) Surface arc welding
 - c) Super arc welding
 - d) Simple arc welding
- 5) The plates are bevelled in _____ joint.
 - a) Butt
 - b) Lap
 - c) Both A and B
 - d) None of the above
- 6) The geometrical characteristics of a surface include
 - a) Macro-deviations
 - b) Surface waviness
 - c) Micro-irregularities
 - d) All of the above
- 7) _____ neck is used to prevent the rotation of the bolt.
 - a) Square
 - b) Round
 - c) Trapezoidal
 - d) Oval
- 8) In solid flange coupling, the flanges are joined by means of
 - a) Hex. head bolts
 - b) Headless taper bolts
 - c) Cotter pin
 - d) Rivets
- 9) Journal bearings can support only
 - a) Axial loads
 - b) Radial loads
 - c) Inclined loads
 - d) None of the above

- 14)



- Page 20 of 24

Seat
No.Set **S**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Machine Drawing & CAD (BTN02304)

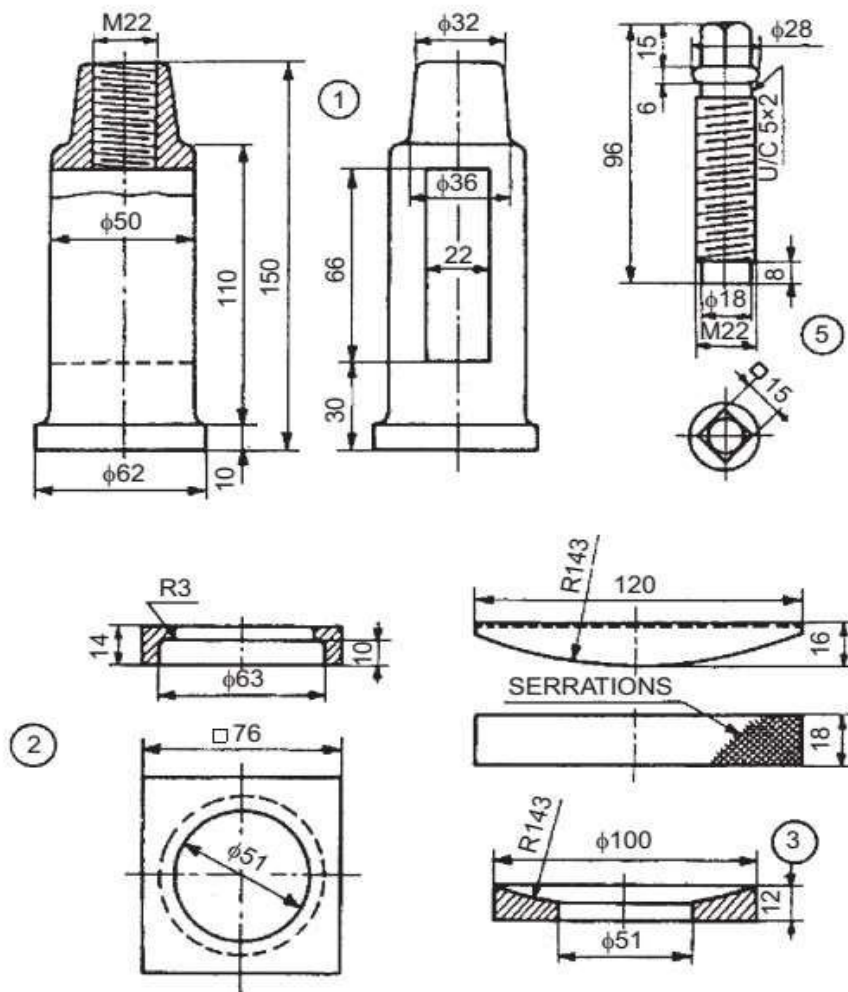
Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) Q. No. 2 are compulsory and out of question no.3 to 5, attempt any two.
 2) Assume suitable dimensions if not given.
 3) Use first angle Method of projections.
 4) Figures to the right indicate full marks.

Q.2 Figure below shows the details of single tool post. Assemble the given parts and draw: **24**

- 1) Front View
- 2) Side View Prepare bill of material and give all the dimensions.



Parts list

No.	Name	Matl	Qty
1	Pillar	MCS	1
2	Block	MCS	1
3	Ring	MS	1
4	Wedge	MCS	1
5	Screw	TS	1

Q.3 Solve any Four out of five. (Every bit has 02 marks)

- a) Draw BIS Convention of
 - i) diamond knurling
 - ii) bearings
- b) Draw Free Hand Sketch of
 - i) Single riveted single strap butt joint
 - ii) Double riveted single strap lap joint
- c) Draw BIS Conventions of
 - i) splined shaft and serrated shaft
 - ii) single butt weld
- d) Draw Free Hand Sketch of
 - i) ACME thread
 - ii) protected flanged nut
- e) Draw BIS Conventions of
 - i) asbestos
 - ii) white metal

Q.4 Solve any Four out of five. (Every bit has 04 marks)

16

- a) Draw BIS Conventions of worm and worm wheel (Both view).
- b) Draw Free Hand Sketch of knuckle joint.
- c) Draw BIS Conventions for ratchet and pinion.
- d) Draw Free Hand Sketch of rag foundation bolt.
- e) Draw Free Hand Sketch Double riveted zig-zag joint.

Q.5 Solve the Following

- a) Identify the type of fit indicated with following fit designation
 - i) $\phi 35H8g7$
 - ii) $\phi 45H6n6$

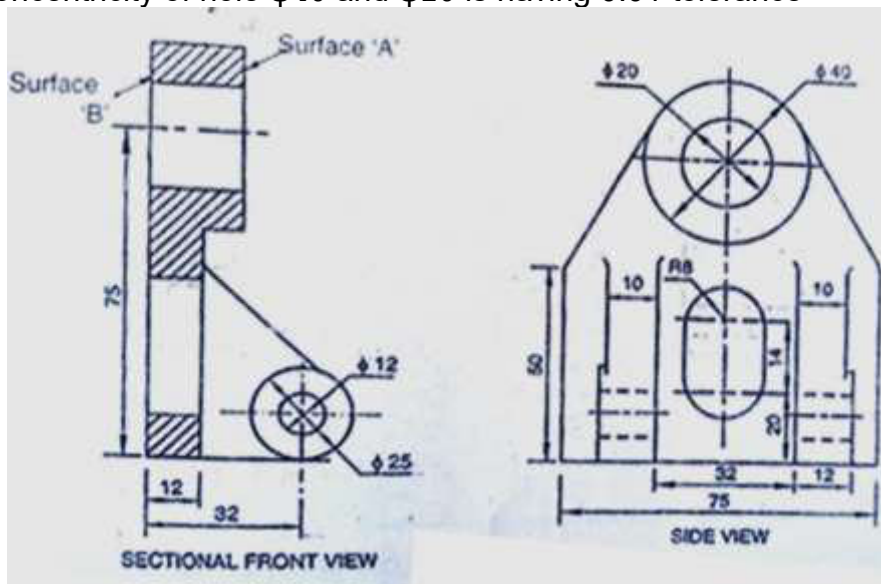
08

Also support the answer by writing the calculations and draw diagram for the same.

- b) Redraw the given views of the machine component shown below and indicate following items on it.

08

- i) axis of $\phi 40$ is perpendicular to surface B within 0.02
- ii) Circularity of $\phi 12$ is within 0.02 mm
- iii) Surface A and surface B are parallel within 0.01 mm
- iv) Concentricity of hole $\phi 40$ and $\phi 20$ is having 0.01 tolerance



Diameter steps in mm		Tolerance Grades																	
		01	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14*	15*	16*
To and inc	3	0.3	0.5	0.8	1.2	2	3	4	6	10	14	25	40	60	100	140	250	400	600
Over	3																		
To and inc	6	0.4	0.6	1	1.5	2.5	4	5	8	12	18	30	48	75	120	180	300	480	750
Over	6																		
To and inc	10	0.4	0.6	1	1.5	2.5	4	6	9	15	22	36	58	90	150	220	360	580	900
Over	10																		
To and inc	18	0.5	0.8	1.2	2	3	5	8	11	18	27	43	70	110	180	270	430	700	1100
Over	18																		
To and inc	30	0.6	1	1.5	2.5	4	6	9	13	21	33	52	84	130	210	330	520	840	1300
Over	30																		
To and inc	50	0.6	1	1.5	2.5	4	7	11	16	25	39	62	100	160	250	390	620	1000	1600
Over	50																		
To and inc	80	0.8	1.2	2	3	5	8	13	19	30	46	74	120	190	300	460	740	1200	1900
Over	80																		
To and inc	120	1	1.5	2.5	4	6	10	15	22	35	54	87	140	220	350	540	870	1400	2200
Over	120																		
To and inc	180	1.2	2	3.5	5	8	12	18	25	40	63	100	160	250	400	630	1000	1600	2500
Over	180																		
To and inc	250	2	3	4.5	7	10	14	20	29	46	72	115	185	290	460	720	1150	1850	2900
Over	250																		
To and inc	315	2.5	4	6	8	12	16	23	32	52	81	130	210	320	520	810	1300	2100	3200
Over	315																		
To and inc	400	3	5	7	9	13	18	25	36	57	89	140	230	360	570	890	1400	2300	3600
Over	400																		
To and inc	500	4	6	8	10	15	20	27	40	63	97	155	250	400	630	970	1550	2500	4000

*Upto 1 mm, Grades 14 to 16 are not provided.

Fundamental deviation in microns										(1 micron = 0.001 mm)					
Diameter steps in mm		Upper deviation (es)								js*	Lower deviation (ei)				
a	b	c	d	e	f	g	h	j	k						
over	upto	All grades								± IT/2	5.6	7	8	4 to 7	≤ 3, > 7
—	*3	-270	-140	-60	-20	-14	-6	-2	0		-2	-4	-6	-0	-0
3	6	-270	-140	-70	-30	-20	-10	-4	0		-2	-4	—	+1	0
6	10	-280	-150	-80	-40	-25	-13	-5	0		-2	-5	—	+1	0
10	14	-290	-150	-95	-50	-32	-16	-6	0		-3	-6	—	+1	0
14	18														
18	24	-300	-160	-110	-65	-40	-20	-7	0		-4	-8	—	+2	0
24	30														
30	40	-310	-170	-120	-80	-50	-25	-9	0		-5	-10	—	+2	0
40	50	-320	-180	-130											
50	65	-340	-190	-140	-100	-60	-30	-10	0	-7	-12	—	+2	0	
65	80	-360	-200	-150											
80	100	-380	-220	-170	-120	-72	-36	-12	0	-9	-15	—	+3	0	
100	120	-410	-240	-180											
120	140	-460	-260	-200											
140	160	-520	-280	-210	-145	-85	-43	-14	0	-11	-18	—	+3	0	
160	180	-580	-310	-230											

Fundamental deviation in microns															(1 micron = 0.001 mm)				
Diameter steps in mm		Lower deviations (ei)																	
		m	n	p	r	s	t	u	v	x	y	z	za	zb	zc				
Over	Upto	All grades																	
—	3	+ 2	+ 4	+ 6	+ 10	+ 14	—	+ 18	—	+ 20	—	+ 26	+ 32	+ 40	+ 60				
3	6	+ 4	+ 8	+ 12	+ 15	+ 19	—	+ 23	—	+ 28	—	+ 35	+ 42	+ 50	+ 80				
6	10	+ 6	+ 10	+ 15	+ 19	+ 23	—	+ 28	—	+ 34	—	+ 42	+ 52	+ 67	+ 97				
10	14	+ 7	+ 12	+ 18	+ 23	+ 28	—	+ 33	—	+ 40	—	+ 50	+ 64	+ 90	+ 130				
14	18									+ 39	+ 45	—	+ 60	+ 77	+ 108	+ 150			
18	24	+ 8	+ 15	+ 22	+ 28	+ 35	—	+ 41	+ 47	+ 54	+ 63	+ 73	+ 98	+ 136	+ 188				
24	30							+ 41	+ 48	+ 55	+ 64	+ 75	+ 98	+ 136	+ 188	+ 240			
30	40	+ 9	+ 17	+ 26	+ 34	+ 43		+ 48	+ 60	+ 68	+ 80	+ 94	+ 112	+ 148	+ 200	+ 274			
40	50							+ 54	+ 70	+ 81	+ 97	+ 114	+ 136	+ 180	+ 242	+ 325			
50	65	+ 11	+ 20	+ 32	+ 41	+ 53	+ 66	+ 87	+ 102	+ 122	+ 144	+ 172	+ 226	+ 300	+ 405				
65	80				+ 43	+ 59	+ 75	+ 102	+ 120	+ 146	+ 174	+ 210	+ 274	+ 360	+ 480				
80	100	+ 13	+ 23	+ 37	+ 51	+ 71	+ 91	+ 124	+ 146	+ 178	+ 214	+ 258	+ 335	+ 445	+ 585				
100	120				+ 54	+ 79	+ 104	+ 144	+ 172	+ 210	+ 254	+ 310	+ 400	+ 525	+ 690				
120	140				+ 63	+ 92	+ 122	+ 170	+ 202	+ 248	+ 300	+ 365	+ 470	+ 620	+ 800				
140	160	+ 15	+ 27	+ 43	+ 65	+ 100	+ 134	+ 190	+ 228	+ 280	+ 340	+ 415	+ 535	+ 700	+ 900				
160	180				+ 68	+ 108	+ 146	+ 210	+ 252	+ 310	+ 380	+ 465	+ 600	+ 780	+ 1000				

Seat No.	
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Set P**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024****MECHANICAL ENGINEERING****Internal Combustion Engines (BTN02306)**

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Draw neat sketches wherever necessary & assume suitable data if necessary.
 5) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.**14**

- 1) For the same compression ratio _____
 - a) Otto cycle is more efficient than the Diesel
 - b) Diesel cycle is more efficient than Otto
 - c) Both Otto and Diesel cycles are, equally efficient
 - d) Compression ratio has nothing to do with efficiency
- 2) A 75 cc engine has following parameter as 75 cc _____
 - a) Fuel tank capacity
 - b) Lubricant oil capacity
 - c) Swept volume
 - d) Cylinder volume
- 3) The air-fuel ratio of the petrol engine is controlled by _____
 - a) Fuel pump
 - b) Governor
 - c) Injector
 - d) Carburetor
- 4) Air fuel ratio for idling speed of a petrol engine is approximately _____
 - a) 1 : 1
 - b) 5 : 1
 - c) 10 : 1
 - d) 15 : 1
- 5) In which of the following engine CRDI is used?
 - a) SI engine
 - b) CI engine
 - c) Steam engine
 - d) None of the above
- 6) In a diesel engine, the fuel is ignited by _____
 - a) Ignition coil
 - b) Spark plug
 - c) Carburetor
 - d) Heat resulting from compressed air
- 7) The operation of forcing additional air under pressure in the engine cylinder is known as _____
 - a) Scavenging
 - b) Turbulence
 - c) Supercharging
 - d) Pre-ignition

Seat No.	
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Set **P**

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Internal Combustion Engines (BTN02306)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Draw neat sketches wherever necessary & assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) What is an I.C. engine? Compare S.I. Engine and C.I. Engine. **05**
 b) Discuss with neat sketch Multiport Point Fuel Injection for SI engines. **05**
 c) State the requirements of diesel fuel injection system and explain common rail injection system **04**
- Q.3** a) What is Turbo-charging? Compare supercharger with turbocharger. **05**
 b) Write the limitations of simple carburetor. Explain acceleration pump system. **05**
 c) Explain with neat diagram CRDI systems used in diesel engines. **04**
- Q.4** a) Discuss the effect of supercharging on the performance of IC engine. **05**
 The venturi of a simple carburetor has throat diameter of 20 mm and its C_d is 0.8. The fuel orifice has diameter of 1.14 mm and C_{dr} is 0.65. The gasoline surface is 5 mm below the throat and pressure drop of 0.08 bar
 b) Find: **05**
 i) Air fuel ratio when nozzle tip is neglected
 ii) Air fuel ratio when nozzle tip is taken into account.
 Take air density as 1.2 kg/m^3 and fuel density as 750 kg/m^3
 c) List various functions of injector nozzle. Explain the pintaux nozzle in detail. **04**

Section – II

- Q.5** a) Explain the various phases of combustion in SI engine. **05**
 b) Compare between petrol knock and diesel knock. **05**
 c) Explain what do you mean by heat balance sheet for I.C. Engines and what is the necessity of heat balance sheet. **04**
- Q.6** a) Discuss abnormal combustion in S.I. Engines. **05**
 b) Write a note on HUCR and Octane Number. **05**
 c) Explain catalytic converter with neat sketch. **04**

- Q.7** **a)** Discuss the requirements of good combustion chamber for S.I. Engines. **05**
Explain any one type in detail.
- b)** A six cylinder gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume per cylinder is 70 cc. At a speed of 4000 rpm, the fuel consumption is 20 Kg/hr and the torque developed is 150 N-m. Calculate: **05**
- i) Brake power
 - ii) The brake mean effective pressure
 - iii) Brake thermal efficiency, if the calorific value is 43000 KJ/kg
 - iv) The relative efficiency on a brake power basis, assuming engine works on the constant volume cycle, for air γ equal 1.4.
- c)** Write a note on EGR and its effects. **04**

- 8) For the same compression ratio _____
a) Otto cycle is more efficient than the Diesel
b) Diesel cycle is more efficient than Otto
c) Both Otto and Diesel cycles are, equally efficient
d) Compression ratio has nothing to do with efficiency
- 9) A 75 cc engine has following parameter as 75 cc _____
a) Fuel tank capacity
b) Lubricant oil capacity
c) Swept volume
d) Cylinder volume
- 10) The air-fuel ratio of the petrol engine is controlled by _____
a) Fuel pump
b) Governor
c) Injector
d) Carburetor
- 11) Air fuel ratio for idling speed of a petrol engine is approximately _____
a) 1 : 1
b) 5 : 1
c) 10 : 1
d) 15 : 1
- 12) In which of the following engine CRDI is used?
a) SI engine
b) CI engine
c) Steam engine
d) None of the above
- 13) In a diesel engine, the fuel is ignited by _____
a) Ignition coil
b) Spark plug
c) Carburetor
d) Heat resulting from compressed air
- 14) The operation of forcing additional air under pressure in the engine cylinder is known as _____
a) Scavenging
b) Turbulence
c) Supercharging
d) Pre-ignition

Seat No.	
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Set **Q**

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Internal Combustion Engines (BTN02306)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Draw neat sketches wherever necessary & assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) What is an I.C. engine? Compare S.I. Engine and C.I. Engine. **05**
 b) Discuss with neat sketch Multiport Point Fuel Injection for SI engines. **05**
 c) State the requirements of diesel fuel injection system and explain common rail injection system **04**
- Q.3** a) What is Turbo-charging? Compare supercharger with turbocharger. **05**
 b) Write the limitations of simple carburetor. Explain acceleration pump system. **05**
 c) Explain with neat diagram CRDI systems used in diesel engines. **04**
- Q.4** a) Discuss the effect of supercharging on the performance of IC engine. **05**
 The venturi of a simple carburetor has throat diameter of 20 mm and its C_d is 0.8. The fuel orifice has diameter of 1.14 mm and C_{dr} is 0.65. The gasoline surface is 5 mm below the throat and pressure drop of 0.08 bar
 b) Find: **05**
 i) Air fuel ratio when nozzle tip is neglected
 ii) Air fuel ratio when nozzle tip is taken into account.
 Take air density as 1.2 kg/m^3 and fuel density as 750 kg/m^3
 c) List various functions of injector nozzle. Explain the pintaux nozzle in detail. **04**

Section – II

- Q.5** a) Explain the various phases of combustion in SI engine. **05**
 b) Compare between petrol knock and diesel knock. **05**
 c) Explain what do you mean by heat balance sheet for I.C. Engines and what is the necessity of heat balance sheet. **04**
- Q.6** a) Discuss abnormal combustion in S.I. Engines. **05**
 b) Write a note on HUCR and Octane Number. **05**
 c) Explain catalytic converter with neat sketch. **04**

- Q.7**
- a)** Discuss the requirements of good combustion chamber for S.I. Engines. **05**
Explain any one type in detail.
- b)** A six cylinder gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume per cylinder is 70 cc. At a speed of 4000 rpm, the fuel consumption is 20 Kg/hr and the torque developed is 150 N-m. Calculate: **05**
- i) Brake power
 - ii) The brake mean effective pressure
 - iii) Brake thermal efficiency, if the calorific value is 43000 KJ/kg
 - iv) The relative efficiency on a brake power basis, assuming engine works on the constant volume cycle, for air γ equal 1.4.
- c)** Write a note on EGR and its effects. **04**

Seat No.	
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Set **R****S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024****MECHANICAL ENGINEERING****Internal Combustion Engines (BTN02306)**

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Draw neat sketches wherever necessary & assume suitable data if necessary.
 5) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.**14**

- 1) Open combustion chambers in CI engines require _____
 a) High injection pressures
 b) Accurate metering of fuel by the injection system
 c) Both (a) and (b)
 d) None of the above
- 2) The ratio of the indicated thermal efficiency to the air standard efficiency is known as _____
 a) Mechanical efficiency
 b) Volumetric efficiency
 c) Overall efficiency
 d) Relative efficiency
- 3) Morse test can be conducted for _____
 a) Petrol engine
 b) Diesel engine
 c) Multi cylinder engine
 d) All of the above
- 4) Three way catalytic converters reduce emission of _____
 a) CO, CO₂ and HC
 b) CO, NO_x and HC
 c) CO₂, NO_x and HC
 d) CO, HC and soot
- 5) For the same compression ratio _____
 a) Otto cycle is more efficient than the Diesel
 b) Diesel cycle is more efficient than Otto
 c) Both Otto and Diesel cycles are, equally efficient
 d) Compression ratio has nothing to do with efficiency
- 6) A 75 cc engine has following parameter as 75 cc _____
 a) Fuel tank capacity
 b) Lubricant oil capacity
 c) Swept volume
 d) Cylinder volume
- 7) The air-fuel ratio of the petrol engine is controlled by _____
 a) Fuel pump
 b) Governor
 c) Injector
 d) Carburetor

Seat No.	
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Set **R**

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Internal Combustion Engines (BTN02306)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Draw neat sketches wherever necessary & assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) What is an I.C. engine? Compare S.I. Engine and C.I. Engine. **05**
 b) Discuss with neat sketch Multiport Point Fuel Injection for SI engines. **05**
 c) State the requirements of diesel fuel injection system and explain common rail injection system **04**
- Q.3** a) What is Turbo-charging? Compare supercharger with turbocharger. **05**
 b) Write the limitations of simple carburetor. Explain acceleration pump system. **05**
 c) Explain with neat diagram CRDI systems used in diesel engines. **04**
- Q.4** a) Discuss the effect of supercharging on the performance of IC engine. **05**
 The venturi of a simple carburetor has throat diameter of 20 mm and its C_d is 0.8. The fuel orifice has diameter of 1.14 mm and C_{dr} is 0.65. The gasoline surface is 5 mm below the throat and pressure drop of 0.08 bar
 b) Find: **05**
 i) Air fuel ratio when nozzle tip is neglected
 ii) Air fuel ratio when nozzle tip is taken into account.
 Take air density as 1.2 kg/m^3 and fuel density as 750 kg/m^3
 c) List various functions of injector nozzle. Explain the pintaux nozzle in detail. **04**

Section – II

- Q.5** a) Explain the various phases of combustion in SI engine. **05**
 b) Compare between petrol knock and diesel knock. **05**
 c) Explain what do you mean by heat balance sheet for I.C. Engines and what is the necessity of heat balance sheet. **04**
- Q.6** a) Discuss abnormal combustion in S.I. Engines. **05**
 b) Write a note on HUCR and Octane Number. **05**
 c) Explain catalytic converter with neat sketch. **04**

- Q.7** **a)** Discuss the requirements of good combustion chamber for S.I. Engines. **05**
Explain any one type in detail.
- b)** A six cylinder gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume per cylinder is 70 cc. At a speed of 4000 rpm, the fuel consumption is 20 Kg/hr and the torque developed is 150 N-m. Calculate: **05**
- i) Brake power
 - ii) The brake mean effective pressure
 - iii) Brake thermal efficiency, if the calorific value is 43000 KJ/kg
 - iv) The relative efficiency on a brake power basis, assuming engine works on the constant volume cycle, for air γ equal 1.4.
- c)** Write a note on EGR and its effects. **04**

Seat No.	
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S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**MECHANICAL ENGINEERING****Internal Combustion Engines (BTN02306)**

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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3) Figures to the right indicates full marks.
4) Draw neat sketches wherever necessary & assume suitable data if necessary.
5) Use of non-programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) In a diesel engine, the fuel is ignited by _____
 - a) Ignition coil
 - b) Spark plug
 - c) Carburetor
 - d) Heat resulting from compressed air
- 2) The operation of forcing additional air under pressure in the engine cylinder is known as _____
 - a) Scavenging
 - b) Turbulence
 - c) Supercharging
 - d) Pre-ignition
- 3) The ignition quality of petrol is expressed by _____
 - a) Cetane number
 - b) Octane number
 - c) Calorific value
 - d) All of the above
- 4) The knocking in SI engines gets reduced _____
 - a) By retarding the spark advance
 - b) By increasing the compression ratio
 - c) By increasing inlet air temperature
 - d) By increasing the cooling water temperature
- 5) Combustion in compression ignition engines is _____
 - a) Homogeneous
 - b) Heterogeneous
 - c) Both (a) and (b)
 - d) Laminar
- 6) Open combustion chambers in CI engines require _____
 - a) High injection pressures
 - b) Accurate metering of fuel by the injection system
 - c) Both (a) and (b)
 - d) None of the above

- 7) The ratio of the indicated thermal efficiency to the air standard efficiency is known as _____
- a) Mechanical efficiency b) Volumetric efficiency
c) Overall efficiency d) Relative efficiency
- 8) Morse test can be conducted for _____
- a) Petrol engine b) Diesel engine
c) Multi cylinder engine d) All of the above
- 9) Three way catalytic converters reduce emission of _____
- a) CO, CO₂ and HC b) CO, NO_x and HC
c) CO₂, NO_x and HC d) CO, HC and soot
- 10) For the same compression ratio _____
- a) Otto cycle is more efficient than the Diesel
b) Diesel cycle is more efficient than Otto
c) Both Otto and Diesel cycles are, equally efficient
d) Compression ratio has nothing to do with efficiency
- 11) A 75 cc engine has following parameter as 75 cc _____
- a) Fuel tank capacity b) Lubricant oil capacity
c) Swept volume d) Cylinder volume
- 12) The air-fuel ratio of the petrol engine is controlled by _____
- a) Fuel pump b) Governor
c) Injector d) Carburetor
- 13) Air fuel ratio for idling speed of a petrol engine is approximately _____
- a) 1 : 1 b) 5 : 1
c) 10 : 1 d) 15 : 1
- 14) In which of the following engine CRDI is used?
- a) SI engine b) CI engine
c) Steam engine d) None of the above

Seat No.	
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Set S

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Internal Combustion Engines (BTN02306)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) Answer any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Draw neat sketches wherever necessary & assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) What is an I.C. engine? Compare S.I. Engine and C.I. Engine. **05**
 b) Discuss with neat sketch Multiport Point Fuel Injection for SI engines. **05**
 c) State the requirements of diesel fuel injection system and explain common rail injection system **04**
- Q.3** a) What is Turbo-charging? Compare supercharger with turbocharger. **05**
 b) Write the limitations of simple carburetor. Explain acceleration pump system. **05**
 c) Explain with neat diagram CRDI systems used in diesel engines. **04**
- Q.4** a) Discuss the effect of supercharging on the performance of IC engine. **05**
 The venturi of a simple carburetor has throat diameter of 20 mm and its C_d is 0.8. The fuel orifice has diameter of 1.14 mm and C_{dr} is 0.65. The gasoline surface is 5 mm below the throat and pressure drop of 0.08 bar
 b) Find: **05**
 i) Air fuel ratio when nozzle tip is neglected
 ii) Air fuel ratio when nozzle tip is taken into account.
 Take air density as 1.2 kg/m^3 and fuel density as 750 kg/m^3
 c) List various functions of injector nozzle. Explain the pintaux nozzle in detail. **04**

Section – II

- Q.5** a) Explain the various phases of combustion in SI engine. **05**
 b) Compare between petrol knock and diesel knock. **05**
 c) Explain what do you mean by heat balance sheet for I.C. Engines and what is the necessity of heat balance sheet. **04**
- Q.6** a) Discuss abnormal combustion in S.I. Engines. **05**
 b) Write a note on HUCR and Octane Number. **05**
 c) Explain catalytic converter with neat sketch. **04**

- Q.7** **a)** Discuss the requirements of good combustion chamber for S.I. Engines. **05**
Explain any one type in detail.
- b)** A six cylinder gasoline engine operates on the four stroke cycle. The bore of each cylinder is 80 mm and the stroke is 100 mm. The clearance volume per cylinder is 70 cc. At a speed of 4000 rpm, the fuel consumption is 20 Kg/hr and the torque developed is 150 N-m. Calculate: **05**
- i) Brake power
 - ii) The brake mean effective pressure
 - iii) Brake thermal efficiency, if the calorific value is 43000 KJ/kg
 - iv) The relative efficiency on a brake power basis, assuming engine works on the constant volume cycle, for air γ equal 1.4.
- c)** Write a note on EGR and its effects. **04**

Set	P
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MECHANICAL ENGINEERING
Composite Material (BTN02307)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each questions carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.

Marks: 14

14

- Page 1 of 12

- 8) Lay-up process is used where _____.
a) low production volume and low performance is required
b) low production volume and high performance is required
c) high production volume and high performance is required
d) high production volume and low performance is required
- 9) Filament winding is _____.
a) used to produce cylindrical surfaces only
b) used to produce curvature surfaces only
c) a process in which resin-impregnated fibers are wound over a rotating mandrel at the desired angle
d) none of the mentioned
- 10) Manufacturing of components having continuous lengths and the constant cross-sectional shape is done by _____ process.
a) Roving
b) Pultrusion
c) Curing
d) Pulling
- 11) The matrix phase controls the environmental resistance of the composites.
a) True
b) False
- 12) In _____ it's a challenge to control the fiber volume fraction,
a) Hand lay-up
b) Injection molding
c) Pultrusion
d) Spray lay-up
- 13) Hand lay-up method can be easily used for manufacturing _____.
a) automotive parts
b) dashboard
c) boat hulls
d) all of the mentioned
- 14) Higher the length to diameter (L/D) ratio, greater opportunity for mixing of polymer and fiber.
a) True
b) False

Seat No.	
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Set	P
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S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Composite Material (BTN02307)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
 2) In Section – II, Question no. 7 is compulsory in section I, and solve any two questions from the remaining.
 3) Figures to the right indicates full marks.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Classify composite materials and explain any one with neat sketch. | 05 |
| | b) Differentiate between Polymer Matrix Composites, Metal Matrix Composites | 05 |
| Q.3 | a) Define Stress, Strain, Elastic Moduli, Strain Energy. | 05 |
| | b) Differentiate between Anisotropic Materials and Orthotropic Material | 04 |
| Q.4 | a) Explain Plane Stress Assumption. | 04 |
| | b) Hooke's Law for a Two-Dimensional Angle Lamina | 05 |
| Q.5 | Write short note on any three | 09 |
| | a) Recycling Fiber-Reinforced Composites | |
| | b) Carbon-Carbon Composites. | |
| | c) Anisotropic Material | |
| | d) Engineering Constants of an Angle Lamina | |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | a) Define Volume Fractions, Mass Fractions, Density, Void Content | 04 |
| | b) Explain Evaluation of the Four Elastic Moduli. | 05 |
| Q.7 | a) Explain Longitudinal Young's Modulus. | 05 |
| | b) Explain In-Plane Shear Modulus. | 05 |
| Q.8 | a) Explain Hand lay-up techniques with neat sketch. | 05 |
| | b) Differentiate Open and closed mold-processing | 04 |
| Q.9 | Write short note on any three | 09 |
| | a) Injection molding | |
| | b) Types of defects | |
| | c) Bag molding and filament winding | |
| | d) Major Poisson's Ratio | |

Seat No.	
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Set Q

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

**MECHANICAL ENGINEERING
Composite Material (BTN02307)**

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each questions carry one mark.
2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Lay-up process is used where _____.
 a) low production volume and low performance is required
 b) low production volume and high performance is required
 c) high production volume and high performance is required
 d) high production volume and low performance is required
- 2) Filament winding is _____.
 a) used to produce cylindrical surfaces only
 b) used to produce curvature surfaces only
 c) a process in which resin-impregnated fibers are wound over a rotating mandrel at the desired angle
 d) none of the mentioned
- 3) Manufacturing of components having continuous lengths and the constant cross-sectional shape is done by _____ process.
 a) Roving
 b) Pultrusion
 c) Curing
 d) Pulling
- 4) The matrix phase controls the environmental resistance of the composites.
 a) True
 b) False
- 5) In _____ it's a challenge to control the fiber volume fraction,
 a) Hand lay-up
 b) Injection molding
 c) Pultrusion
 d) Spray lay-up
- 6) Hand lay-up method can be easily used for manufacturing _____.
 a) automotive parts
 b) dashboard
 c) boat hulls
 d) all of the mentioned
- 7) Higher the length to diameter (L/D) ratio, greater opportunity for mixing of polymer and fiber.
 a) True
 b) False
- 8) Composites can be classified based on _____.
 a) Matrix type
 b) Reinforcement constituent
 c) Matrix type & reinforcement constituent
 d) Neither on matrix type nor on reinforcement constituent type

Seat No.	
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S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Composite Material (BTN02307)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
 2) In Section – II, Question no. 7 is compulsory in section I, and solve any two questions from the remaining.
 3) Figures to the right indicates full marks.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Classify composite materials and explain any one with neat sketch. | 05 |
| | b) Differentiate between Polymer Matrix Composites, Metal Matrix Composites | 05 |
| Q.3 | a) Define Stress, Strain, Elastic Moduli, Strain Energy. | 05 |
| | b) Differentiate between Anisotropic Materials and Orthotropic Material | 04 |
| Q.4 | a) Explain Plane Stress Assumption. | 04 |
| | b) Hooke's Law for a Two-Dimensional Angle Lamina | 05 |
| Q.5 | Write short note on any three | 09 |
| | a) Recycling Fiber-Reinforced Composites | |
| | b) Carbon-Carbon Composites. | |
| | c) Anisotropic Material | |
| | d) Engineering Constants of an Angle Lamina | |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | a) Define Volume Fractions, Mass Fractions, Density, Void Content | 04 |
| | b) Explain Evaluation of the Four Elastic Moduli. | 05 |
| Q.7 | a) Explain Longitudinal Young's Modulus. | 05 |
| | b) Explain In-Plane Shear Modulus. | 05 |
| Q.8 | a) Explain Hand lay-up techniques with neat sketch. | 05 |
| | b) Differentiate Open and closed mold-processing | 04 |
| Q.9 | Write short note on any three | 09 |
| | a) Injection molding | |
| | b) Types of defects | |
| | c) Bag molding and filament winding | |
| | d) Major Poisson's Ratio | |

Set	R
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MECHANICAL ENGINEERING
Composite Material (BTN02307)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each questions carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.

Marks: 14

14

- Page 7 of 12

- 10)** Which of the following is not an advantage of composites?
- a) Easy to manufacture and durable
 - b) Excellent thermal, mechanical, & chemical properties
 - c) Heavy-weight and non-versatile
 - d) Economical and tailor made
- 11)** Hand lay-up process predominantly uses _____ fibers.
- a) unidirectional
 - b) bidirectional
 - c) multidirectional
 - d) none of the above
- Lay-up process is used where _____.
- 12)**
- a) low production volume and low performance is required
 - b) low production volume and high performance is required
 - c) high production volume and high performance is required
 - d) high production volume and low performance is required
- 13)** Filament winding is _____.
- a) used to produce cylindrical surfaces only
 - b) used to produce curvature surfaces only
 - c) a process in which resin-impregnated fibers are wound over a rotating mandrel at the desired angle
 - d) none of the mentioned
- 14)** Manufacturing of components having continuous lengths and the constant cross-sectional shape is done by _____ process.
- a) Roving
 - b) Pultrusion
 - c) Curing
 - d) Pulling

Seat No.	
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Set

R

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Composite Material (BTN02307)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
 2) In Section – II, Question no. 7 is compulsory in section I, and solve any two questions from the remaining.
 3) Figures to the right indicates full marks.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Classify composite materials and explain any one with neat sketch. | 05 |
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| Q.3 | a) Define Stress, Strain, Elastic Moduli, Strain Energy. | 05 |
| | b) Differentiate between Anisotropic Materials and Orthotropic Material | 04 |
| Q.4 | a) Explain Plane Stress Assumption. | 04 |
| | b) Hooke's Law for a Two-Dimensional Angle Lamina | 05 |
| Q.5 | Write short note on any three | 09 |
| | a) Recycling Fiber-Reinforced Composites | |
| | b) Carbon-Carbon Composites. | |
| | c) Anisotropic Material | |
| | d) Engineering Constants of an Angle Lamina | |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | a) Define Volume Fractions, Mass Fractions, Density, Void Content | 04 |
| | b) Explain Evaluation of the Four Elastic Moduli. | 05 |
| Q.7 | a) Explain Longitudinal Young's Modulus. | 05 |
| | b) Explain In-Plane Shear Modulus. | 05 |
| Q.8 | a) Explain Hand lay-up techniques with neat sketch. | 05 |
| | b) Differentiate Open and closed mold-processing | 04 |
| Q.9 | Write short note on any three | 09 |
| | a) Injection molding | |
| | b) Types of defects | |
| | c) Bag molding and filament winding | |
| | d) Major Poisson's Ratio | |

Seat No.	
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Set **S****S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**

MECHANICAL ENGINEERING
Composite Material (BTN02307)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each questions carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.**14**

- 1) Which of the following is not an advantage of composites?
 - a) Easy to manufacture and durable
 - b) Excellent thermal, mechanical, & chemical properties
 - c) Heavy-weight and non-versatile
 - d) Economical and tailor made
- 2) Hand lay-up process predominantly uses _____ fibers.
 - a) unidirectional
 - b) bidirectional
 - c) multidirectional
 - d) none of the above
- 3) Lay-up process is used where _____.
 - a) low production volume and low performance is required
 - b) low production volume and high performance is required
 - c) high production volume and high performance is required
 - d) high production volume and low performance is required
- 4) Filament winding is _____.
 - a) used to produce cylindrical surfaces only
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 - c) a process in which resin-impregnated fibers are wound over a rotating mandrel at the desired angle
 - d) none of the mentioned
- 5) Manufacturing of components having continuous lengths and the constant cross-sectional shape is done by _____ process.
 - a) Roving
 - b) Pultrusion
 - c) Curing
 - d) Pulling
- 6) The matrix phase controls the environmental resistance of the composites.
 - a) True
 - b) False
- 7) In _____ it's a challenge to control the fiber volume fraction,
 - a) Hand lay-up
 - b) Injection molding
 - c) Pultrusion
 - d) Spray lay-up
- 8) Hand lay-up method can be easily used for manufacturing _____.
 - a) automotive parts
 - b) dashboard
 - c) boat hulls
 - d) all of the mentioned

Seat No.	
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S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Composite Material (BTN02307)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, Question no. 2 is compulsory in section I, and solve any two questions from the remaining.
 2) In Section – II, Question no. 7 is compulsory in section I, and solve any two questions from the remaining.
 3) Figures to the right indicates full marks.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | a) Classify composite materials and explain any one with neat sketch. | 05 |
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| Q.4 | a) Explain Plane Stress Assumption. | 04 |
| | b) Hooke's Law for a Two-Dimensional Angle Lamina | 05 |
| Q.5 | Write short note on any three | 09 |
| | a) Recycling Fiber-Reinforced Composites | |
| | b) Carbon-Carbon Composites. | |
| | c) Anisotropic Material | |
| | d) Engineering Constants of an Angle Lamina | |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | a) Define Volume Fractions, Mass Fractions, Density, Void Content | 04 |
| | b) Explain Evaluation of the Four Elastic Moduli. | 05 |
| Q.7 | a) Explain Longitudinal Young's Modulus. | 05 |
| | b) Explain In-Plane Shear Modulus. | 05 |
| Q.8 | a) Explain Hand lay-up techniques with neat sketch. | 05 |
| | b) Differentiate Open and closed mold-processing | 04 |
| Q.9 | Write short note on any three | 09 |
| | a) Injection molding | |
| | b) Types of defects | |
| | c) Bag molding and filament winding | |
| | d) Major Poisson's Ratio | |

Seat No.	
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Set **P**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Engineering Mathematics – III (BTN02401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The value of $\frac{1}{D+a} X = \underline{\hspace{2cm}}$.
 - a) $e^{-ax} \int e^{-ax} X dx$
 - b) $e^{-ax} \int e^{ax} X dx$
 - c) $e^{ax} \int e^{-ax} X dx$
 - d) $e^{ax} \int e^{ax} X dx$
- 2) The complementary function of $(D^2 + 2D + 1)y = 2e^{3x}$ is _____.
 - a) $c_1 e^{-x} + c_2 e^{-x}$
 - b) $(c_1 + c_2 x)e^{-2x}$
 - c) $(c_1 \cos x + c_2 \sin x)$
 - d) $(c_1 + c_2 x)e^{-x}$
- 3) The general solution of $(D^3 + 4D^2 + D - 6)Y = 0$ is _____.
 - a) $y = c_1 e^x + c_2 e^{-2x} + c_3 e^{-3x}$
 - b) $y = c_1 e^{-x} + c_2 e^{-2x} + c_3 e^{-3x}$
 - c) $y = c_1 e^{2x} + c_2 e^{3x} + c_3 e^x$
 - d) $y = c_1 e^{4x} + c_2 e^{3x} + c_3 e^{2x}$
- 4) The solution of $p^3 - q^3 = 0$ is _____.
 - a) $z = ax + by + c$
 - b) $z = ax + a^3 y + c$
 - c) $z = ax - ay + c$
 - d) $z = ax + ay + c$
- 5) Which of the following is Lagrange's equation?
 - a) $p^2 x + q^2 y = z$
 - b) $qy = px + z$
 - c) $px + q^2 y = z$
 - d) $p^2 x - qy = z^2$
- 6) The coefficient of $\cos(nx)$ in the Fourier series of $f(x) = x^3$ in $(-\pi, \pi)$ is _____.
 - a) 0
 - b) $\frac{1}{n}$
 - c) $\frac{4(-1)^n}{n^2}$
 - d) $\frac{-2(-1)^n}{n}$
- 7) In the interval $(0, \pi)$ the constant term in the half range cosine series of $f(x) = x^2$ is _____.
 - a) π
 - b) π^2
 - c) $\frac{\pi^2}{2}$
 - d) $\frac{\pi}{2}$

- 8) If $L\{f(t)\} = \phi(s)$, then $L\left\{\frac{f(t)}{t}\right\}$ is _____.
 a) $\frac{1}{s}\phi(s)$ b) $\frac{-1}{s}\phi(s)$
 c) $\int_0^\infty \phi(s)ds$ d) $\int_s^\infty \phi(s)ds$
- 9) $L^{-1}\left\{\frac{1}{(s-3)^2 + 16}\right\} =$ _____.
 a) $\frac{e^{3t}}{4}\sin 4t$ b) $\frac{e^{-3t}}{4}\sin 4t$
 c) $e^{3t}\cos 4t$ d) $e^{-3t}\cos 4t$
- 10) If $L\{f(t)\} = \varphi(s)$, then $L\{f(at)\} =$ _____.
 a) $\varphi(s/a)$ b) $\frac{1}{s}\varphi(s/a)$
 c) $\frac{1}{a}\varphi(s/a)$ d) None of these
- 11) The value of correlation coefficient r lies between _____.
 a) -1 and 1 b) $-\infty$ and ∞
 c) 0 and ∞ d) None of these
- 12) Given the two lines of regression $3x - 4y + 8 = 0$, $4x - 3y = 1$, the mean of x & y are respectively.
 a) $-4, -5$ b) $-5, -4$
 c) $4, 5$ d) $5, 4$
- 13) For binomial distribution the mean is 2 and standard deviation is 1. Hence the value of n is equal to _____.
 a) 2 b) 4
 c) 3 d) 1
- 14) The area under the standard normal curve from $z = -\infty$ to $z = 0$ is _____.
 a) 1 b) 0
 c) 1.5 d) 0.5

Seat No.	
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Set **P**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING**Engineering Mathematics – III (BTN02401)**

Day & Date: Wednesday, 22-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Section – I**Q.2 Solve any Three of the following.****09**

- Solve $(D^2 + 4D + 4)y = x^2$
- Solve $(D^2 - 1)y = e^x \cos x$
- Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$
- Solve $px - qy = y^2 - x^2$
- Find Fourier series of $f(x) = x^2$ in $(0, 2\pi)$

Q.3 Solve any Three of the following.**09**

- Solve $(D^2 + 3D + 2)y = e^{e^x}$
- Solve $(D^2 + 4)y = x \sin x$
- Solve $pq = x^4 y^3, z^4$
- Solve $(p^3 + q^3) = 27z$
- Obtain half range cosine series for $f(x) = x$ in $0 < x < 2$

Q.4 Solve any Two of the following.**10**

- Solve the P.D.E. $\frac{\partial u}{\partial x} - 4 \frac{\partial u}{\partial t} = 0$, given $u(0, t) = 8e^{-3t}$ by the method of separation of variable.
- Obtain Fourier series of $f(x) = x + x^2$ in the rang $-\pi < x < \pi$.
- The deflection of a strut with one end built-in and other supported and subjected to end-thrust P satisfies the equation $\frac{d^2 y}{dx^2} + a^2 y = \frac{a^2 R}{P}(l - x)$.

Given that $\frac{dy}{dx} = 0, y = 0$ when $x = 0$ & $y = 0$ when $x = l$. Prove that

$$y = \frac{R}{P} \left[\frac{\sin ax}{a} - l \cos ax + l - x \right] \text{ where } al = \tan al \text{ and } l \text{ is the length of the Strut.}$$

Section – II**Q.5 Solve any Three of the following.****09**

- Find the Laplace transform of $te^{2t} + 2t \sin 3t$
- Find the Laplace Transform of $\frac{1 - \cos t}{t}$
- Compute $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.

- d) Find an approximate root of $x \log_{10} x - 1.2 = 0$ by False Position method (Perform 2 iterations)
- e) Find the coefficient of correlation between x and y from the following data:
 $n = 25, \Sigma x = 120, \Sigma x^2 = 650, \Sigma y = 100, \Sigma y^2 = 450, \Sigma xy = 500$

Q.6 Solve any Three of the following.**09**

- a) Find the Laplace Transform of $\int_0^t \frac{\sin u}{u} du$
- b) Find the positive root of $x^4 - x = 10$ correct to three decimal places by Newton-Raphson method. Take $x_0 = 2$ as initial approximation. (Perform three iterations).
- c) If 3% of bulbs manufactured by a company are defective, assuming Poisson distribution find the probability that in a pack of 100 bulbs
 i) zero bulbs
 ii) two bulbs are defective
- d) Weights of 4000 students are found to be normally distributed with mean 50 kgs and S.D. 5 kgs. Find the number of students with weights between 45 and 60 kgs.
 (For SNV z area under the Curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- e) Find $L\{e^{4t} \sin^3 t\}$

Q.7 Solve any Two of the following.**10**

- a) Find inverse Laplace transform of by using convolution theorem $\frac{s}{(s^2+4)^2}$
- b) Obtain the Karl Pearson's coefficient of correlation between export of raw material (x) and import of finished goods (y) from the data
- | | | | | | | | |
|-------|----|----|----|----|----|----|----|
| x : | 42 | 44 | 58 | 55 | 89 | 98 | 66 |
| y : | 56 | 59 | 53 | 58 | 65 | 78 | 58 |
- c) Evaluate $\int_0^1 e^x dx$ by using Simpsons $\left(\frac{1}{3}\right)^{\text{rd}}$ and $\left(\frac{3}{8}\right)^{\text{th}}$ rule.

Seat No.	
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Set **Q**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Engineering Mathematics – III (BTN02401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.**14**

- 1) If $L\{f(t)\} = \phi(s)$, then $L\left\{\frac{f(t)}{t}\right\}$ is _____.
 - a) $\frac{1}{s}\phi(s)$
 - b) $\frac{-1}{s}\phi(s)$
 - c) $\int_0^\infty \phi(s)ds$
 - d) $\int_s^\infty \phi(s)ds$
- 2) $L^{-1}\left\{\frac{1}{(s-3)^2 + 16}\right\} =$ _____.
 - a) $\frac{e^{3t}}{4}\sin 4t$
 - b) $\frac{e^{-3t}}{4}\sin 4t$
 - c) $e^{3t}\cos 4t$
 - d) $e^{-3t}\cos 4t$
- 3) If $L\{f(t)\} = \phi(s)$, then $L\{f(at)\} =$ _____.
 - a) $\phi(s/a)$
 - b) $\frac{1}{s}\phi(s/a)$
 - c) $\frac{1}{a}\phi(s/a)$
 - d) None of these
- 4) The value of correlation coefficient r lies between _____.
 - a) -1 and 1
 - b) $-\infty$ and ∞
 - c) 0 and ∞
 - d) None of these
- 5) Given the two lines of regression $3x - 4y + 8 = 0$, $4x - 3y = 1$, the mean of x & y are respectively.
 - a) $-4, -5$
 - b) $-5, -4$
 - c) $4, 5$
 - d) $5, 4$
- 6) For binomial distribution the mean is 2 and standard deviation is 1. Hence the value of n is equal to _____.
 - a) 2
 - b) 4
 - c) 3
 - d) 1

- Page 6 of 16

Seat No.	
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Set **Q**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING**Engineering Mathematics – III (BTN02401)**

Day & Date: Wednesday, 22-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Section – I**Q.2 Solve any Three of the following.****09**

- Solve $(D^2 + 4D + 4)y = x^2$
- Solve $(D^2 - 1)y = e^x \cos x$
- Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$
- Solve $px - qy = y^2 - x^2$
- Find Fourier series of $f(x) = x^2$ in $(0, 2\pi)$

Q.3 Solve any Three of the following.**09**

- Solve $(D^2 + 3D + 2)y = e^{e^x}$
- Solve $(D^2 + 4)y = x \sin x$
- Solve $pq = x^4 y^3, z^4$
- Solve $(p^3 + q^3) = 27z$
- Obtain half range cosine series for $f(x) = x$ in $0 < x < 2$

Q.4 Solve any Two of the following.**10**

- Solve the P.D.E. $\frac{\partial u}{\partial x} - 4 \frac{\partial u}{\partial t} = 0$, given $u(0, t) = 8e^{-3t}$ by the method of separation of variable.
- Obtain Fourier series of $f(x) = x + x^2$ in the rang $-\pi < x < \pi$.
- The deflection of a strut with one end built-in and other supported and subjected to end-thrust P satisfies the equation $\frac{d^2 y}{dx^2} + a^2 y = \frac{a^2 R}{P}(l - x)$.

Given that $\frac{dy}{dx} = 0, y = 0$ when $x = 0$ & $y = 0$ when $x = l$. Prove that

$$y = \frac{R}{P} \left[\frac{\sin ax}{a} - l \cos ax + l - x \right] \text{ where } al = \tan al \text{ and } l \text{ is the length of the Strut.}$$

Section – II**Q.5 Solve any Three of the following.****09**

- Find the Laplace transform of $te^{2t} + 2t \sin 3t$
- Find the Laplace Transform of $\frac{1 - \cos t}{t}$
- Compute $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.

- d) Find an approximate root of $x \log_{10} x - 1.2 = 0$ by False Position method (Perform 2 iterations)
- e) Find the coefficient of correlation between x and y from the following data:
 $n = 25, \Sigma x = 120, \Sigma x^2 = 650, \Sigma y = 100, \Sigma y^2 = 450, \Sigma xy = 500$

Q.6 Solve any Three of the following.**09**

- a) Find the Laplace Transform of $\int_0^t \frac{\sin u}{u} du$
- b) Find the positive root of $x^4 - x = 10$ correct to three decimal places by Newton-Raphson method. Take $x_0 = 2$ as initial approximation. (Perform three iterations).
- c) If 3% of bulbs manufactured by a company are defective, assuming Poisson distribution find the probability that in a pack of 100 bulbs
 i) zero bulbs
 ii) two bulbs are defective
- d) Weights of 4000 students are found to be normally distributed with mean 50 kgs and S.D. 5 kgs. Find the number of students with weights between 45 and 60 kgs.
 (For SNV z area under the Curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- e) Find $L\{e^{4t} \sin^3 t\}$

Q.7 Solve any Two of the following.**10**

- a) Find inverse Laplace transform of by using convolution theorem $\frac{s}{(s^2+4)^2}$
- b) Obtain the Karl Pearson's coefficient of correlation between export of raw material (x) and import of finished goods (y) from the data
- | | | | | | | | |
|-------|----|----|----|----|----|----|----|
| x : | 42 | 44 | 58 | 55 | 89 | 98 | 66 |
| y : | 56 | 59 | 53 | 58 | 65 | 78 | 58 |
- c) Evaluate $\int_0^1 e^x dx$ by using Simpsons $\left(\frac{1}{3}\right)^{\text{rd}}$ and $\left(\frac{3}{8}\right)^{\text{th}}$ rule.

Seat No.	
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MECHANICAL ENGINEERING

Max. Marks: 70

3) Figures to the right indicates full marks.

Marks:14

14

- 1) The value of correlation coefficient r lies between _____.
a) -1 and 1 b) $-\infty$ and ∞
c) 0 and ∞ d) None of these
- 2) Given the two lines of regression $3x - 4y + 8 = 0$, $4x - 3y = 1$, the mean of x & y are respectively.
a) $-4, -5$ b) $-5, -4$
c) $4, 5$ d) $5, 4$
- 3) For binomial distribution the mean is 2 and standard deviation is 1 . Hence the value of n is equal to _____.
a) 2 b) 4
c) 3 d) 1
- 4) The area under the standard normal curve from $z = -\infty$ to $z = 0$ is _____.
a) 1 b) 0
c) 1.5 d) 0.5
- 5) The value of $\frac{1}{D+a} X =$ _____.
a) $e^{-ax} \int e^{-ax} X dx$ b) $e^{-ax} \int e^{ax} X dx$
c) $e^{ax} \int e^{-ax} X dx$ d) $e^{ax} \int e^{ax} X dx$
- 6) The complementary function of $(D^2 + 2D + 1)y = 2e^{3x}$ is _____.
a) $c_1 e^{-x} + c_2 e^{-x}$ b) $(c_1 + c_2 x)e^{-2x}$
c) $(c_1 \cos x + c_2 \sin x)$ d) $(c_1 + c_2 x)e^{-x}$
- 7) The general solution of $(D^3 + 4D^2 + D - 6)Y = 0$ is _____.
a) $y = c_1 e^x + c_2 e^{-2x} + c_3 e^{-3x}$ b) $y = c_1 e^{-x} + c_2 e^{-2x} + c_3 e^{-3x}$
c) $y = c_1 e^{2x} + c_2 e^{3x} + c_3 e^x$ d) $y = c_1 e^{4x} + c_2 e^{3x} + c_3 e^{2x}$

- 8) The solution of $p^3 - q^3 = 0$ is _____.
 a) $z = ax + by + c$ b) $z = ax + a^3y + c$
 c) $z = ax - ay + c$ d) $z = ax + ay + c$
- 9) Which of the following is Lagrange's equation?
 a) $p^2x + q^2y = z$ b) $qy = px + z$
 c) $px + q^2y = z$ d) $p^2x - qy = z^2$
- 10) The coefficient of $\cos(nx)$ in the Fourier series of $f(x) = x^3$ in $(-\pi, \pi)$ is _____.
 a) 0 b) $\frac{1}{n}$
 c) $\frac{4(-1)^n}{n^2}$ d) $\frac{-2(-1)^n}{n}$
- 11) In the interval $(0, \pi)$ the constant term in the half range cosine series of $f(x) = x^2$ is _____.
 a) π b) π^2
 c) $\frac{\pi^2}{2}$ d) $\frac{\pi}{2}$
- 12) If $L\{f(t)\} = \phi(s)$, then $L\left\{\frac{f(t)}{t}\right\}$ is _____.
 a) $\frac{1}{s}\phi(s)$ b) $\frac{-1}{s}\phi(s)$
 c) $\int_0^\infty \phi(s)ds$ d) $\int_s^\infty \phi(s)ds$
- 13) $L^{-1}\left\{\frac{1}{(s-3)^2 + 16}\right\} =$ _____.
 a) $\frac{e^{3t}}{4}\sin 4t$ b) $\frac{e^{-3t}}{4}\sin 4t$
 c) $e^{3t}\cos 4t$ d) $e^{-3t}\cos 4t$
- 14) If $L\{f(t)\} = \varphi(s)$, then $L\{f(at)\} =$ _____.
 a) $\varphi(s/a)$ b) $\frac{1}{s}\varphi(s/a)$
 c) $\frac{1}{a}\varphi(s/a)$ d) None of these

Seat No.	
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Set **R**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING**Engineering Mathematics – III (BTN02401)**

Day & Date: Wednesday, 22-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of non-programmable calculator is allowed.

Section – I**Q.2 Solve any Three of the following.****09**

- Solve $(D^2 + 4D + 4)y = x^2$
- Solve $(D^2 - 1)y = e^x \cos x$
- Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$
- Solve $px - qy = y^2 - x^2$
- Find Fourier series of $f(x) = x^2$ in $(0, 2\pi)$

Q.3 Solve any Three of the following.**09**

- Solve $(D^2 + 3D + 2)y = e^{e^x}$
- Solve $(D^2 + 4)y = x \sin x$
- Solve $pq = x^4 y^3, z^4$
- Solve $(p^3 + q^3) = 27z$
- Obtain half range cosine series for $f(x) = x$ in $0 < x < 2$

Q.4 Solve any Two of the following.**10**

- Solve the P.D.E. $\frac{\partial u}{\partial x} - 4 \frac{\partial u}{\partial t} = 0$, given $u(0, t) = 8e^{-3t}$ by the method of separation of variable.
- Obtain Fourier series of $f(x) = x + x^2$ in the rang $-\pi < x < \pi$.
- The deflection of a strut with one end built-in and other supported and subjected to end-thrust P satisfies the equation $\frac{d^2 y}{dx^2} + a^2 y = \frac{a^2 R}{P}(l - x)$.

Given that $\frac{dy}{dx} = 0, y = 0$ when $x = 0$ & $y = 0$ when $x = l$. Prove that

$$y = \frac{R}{P} \left[\frac{\sin ax}{a} - l \cos ax + l - x \right] \text{ where } al = \tan al \text{ and } l \text{ is the length of the Strut.}$$

Section – II**Q.5 Solve any Three of the following.****09**

- Find the Laplace transform of $te^{2t} + 2t \sin 3t$
- Find the Laplace Transform of $\frac{1 - \cos t}{t}$
- Compute $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.

- d) Find an approximate root of $x \log_{10} x - 1.2 = 0$ by False Position method (Perform 2 iterations)
- e) Find the coefficient of correlation between x and y from the following data:
 $n = 25, \Sigma x = 120, \Sigma x^2 = 650, \Sigma y = 100, \Sigma y^2 = 450, \Sigma xy = 500$

Q.6 Solve any Three of the following.**09**

- a) Find the Laplace Transform of $\int_0^t \frac{\sin u}{u} du$
- b) Find the positive root of $x^4 - x = 10$ correct to three decimal places by Newton-Raphson method. Take $x_0 = 2$ as initial approximation. (Perform three iterations).
- c) If 3% of bulbs manufactured by a company are defective, assuming Poisson distribution find the probability that in a pack of 100 bulbs
 i) zero bulbs
 ii) two bulbs are defective
- d) Weights of 4000 students are found to be normally distributed with mean 50 kgs and S.D. 5 kgs. Find the number of students with weights between 45 and 60 kgs.
 (For SNV z area under the Curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- e) Find $L\{e^{4t} \sin^3 t\}$

Q.7 Solve any Two of the following.**10**

- a) Find inverse Laplace transform of by using convolution theorem $\frac{s}{(s^2+4)^2}$
- b) Obtain the Karl Pearson's coefficient of correlation between export of raw material (x) and import of finished goods (y) from the data
- | | | | | | | | |
|-------|----|----|----|----|----|----|----|
| x : | 42 | 44 | 58 | 55 | 89 | 98 | 66 |
| y : | 56 | 59 | 53 | 58 | 65 | 78 | 58 |
- c) Evaluate $\int_0^1 e^x dx$ by using Simpsons $\left(\frac{1}{3}\right)^{\text{rd}}$ and $\left(\frac{3}{8}\right)^{\text{th}}$ rule.

**Seat
No.**

Max. Marks: 70

Marks:14

a) -1 and 1 b) $-\infty$ and ∞
c) 0 and ∞ d) None of these

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Seat No.	
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Set **S****S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****MECHANICAL ENGINEERING****Engineering Mathematics – III (BTN02401)**

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non-programmable calculator is allowed.

Section – I**Q.2 Solve any Three of the following.****09**

- Solve $(D^2 + 4D + 4)y = x^2$
- Solve $(D^2 - 1)y = e^x \cos x$
- Solve $(5z - 7y)p + (7x - 3z)q = 3y - 5x$
- Solve $px - qy = y^2 - x^2$
- Find Fourier series of $f(x) = x^2$ in $(0, 2\pi)$

Q.3 Solve any Three of the following.**09**

- Solve $(D^2 + 3D + 2)y = e^{e^x}$
- Solve $(D^2 + 4)y = x \sin x$
- Solve $pq = x^4 y^3, z^4$
- Solve $(p^3 + q^3) = 27z$
- Obtain half range cosine series for $f(x) = x$ in $0 < x < 2$

Q.4 Solve any Two of the following.**10**

- Solve the P.D.E. $\frac{\partial u}{\partial x} - 4 \frac{\partial u}{\partial t} = 0$, given $u(0, t) = 8e^{-3t}$ by the method of separation of variable.
- Obtain Fourier series of $f(x) = x + x^2$ in the rang $-\pi < x < \pi$.
- The deflection of a strut with one end built-in and other supported and subjected to end-thrust P satisfies the equation $\frac{d^2 y}{dx^2} + a^2 y = \frac{a^2 R}{P}(l - x)$.

Given that $\frac{dy}{dx} = 0, y = 0$ when $x = 0$ & $y = 0$ when $x = l$. Prove that

$$y = \frac{R}{P} \left[\frac{\sin ax}{a} - l \cos ax + l - x \right] \text{ where } al = \tan al \text{ and } l \text{ is the length of the Strut.}$$

Section – II**Q.5 Solve any Three of the following.****09**

- Find the Laplace transform of $te^{2t} + 2t \sin 3t$
- Find the Laplace Transform of $\frac{1 - \cos t}{t}$
- Compute $\int_0^6 \frac{dx}{1+x^2}$ by using Trapezoidal rule.

- d) Find an approximate root of $x \log_{10} x - 1.2 = 0$ by False Position method (Perform 2 iterations)
- e) Find the coefficient of correlation between x and y from the following data:
 $n = 25, \Sigma x = 120, \Sigma x^2 = 650, \Sigma y = 100, \Sigma y^2 = 450, \Sigma xy = 500$

Q.6 Solve any Three of the following.**09**

- a) Find the Laplace Transform of $\int_0^t \frac{\sin u}{u} du$
- b) Find the positive root of $x^4 - x = 10$ correct to three decimal places by Newton-Raphson method. Take $x_0 = 2$ as initial approximation. (Perform three iterations).
- c) If 3% of bulbs manufactured by a company are defective, assuming Poisson distribution find the probability that in a pack of 100 bulbs
 i) zero bulbs
 ii) two bulbs are defective
- d) Weights of 4000 students are found to be normally distributed with mean 50 kgs and S.D. 5 kgs. Find the number of students with weights between 45 and 60 kgs.
 (For SNV z area under the Curve between $z = 0$ and $z = 1$ is 0.3413 and between $z = 0$ and $z = 2$ is 0.4772)
- e) Find $L\{e^{4t} \sin^3 t\}$

Q.7 Solve any Two of the following.**10**

- a) Find inverse Laplace transform of by using convolution theorem $\frac{s}{(s^2+4)^2}$
- b) Obtain the Karl Pearson's coefficient of correlation between export of raw material (x) and import of finished goods (y) from the data
- | | | | | | | | |
|-------|----|----|----|----|----|----|----|
| x : | 42 | 44 | 58 | 55 | 89 | 98 | 66 |
| y : | 56 | 59 | 53 | 58 | 65 | 78 | 58 |
- c) Evaluate $\int_0^1 e^x dx$ by using Simpsons $\left(\frac{1}{3}\right)^{\text{rd}}$ and $\left(\frac{3}{8}\right)^{\text{th}}$ rule.

Seat No.	
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Set P**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****MECHANICAL ENGINEERING****Manufacturing Technology (BTN02402)**

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
3) Figures to the right indicates full marks.
4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.**14**

- 1) Back gear mechanism is used to _____.
 - a) reduce the spindle speed
 - b) rotate the spindle in reverse direction
 - c) provide power feed to the cutting tool
 - d) All of the above
- 2) The chuck used for setting up of heavy and irregular shaped work should be _____.
 - a) Three jaw universal chuck
 - b) four jaw independent chuck
 - c) Magnetic chuck
 - d) drill chuck
- 3) A reamer is used to correct the _____.
 - a) size and position of drilled hole
 - b) size and roundness of hole
 - c) finish and position of drilled hole
 - d) finish and size of a drilled hole
- 4) The work piece motion and tool motion respectively in a horizontal boring machine are _____.
 - a) stationary and rotational
 - b) rotational and translational
 - c) translational and rotational
 - d) stationary and rotational with translation
- 5) In a planer _____.
 - a) tool is stationary and the work reciprocates
 - b) work is stationary and the tool reciprocates
 - c) tool and work both reciprocates
 - d) none of the above
- 6) Climb milling is chosen while machining because _____.
 - a) Chip thickness increases gradually
 - b) Power consumption is reduced
 - c) Better surface finish
 - d) None of above

- 7) An arbor is used to _____.
a) hold the milling cutter b) control the feed motion
c) support milling machine d) guide the job
- 8) A 46 K 5 V - in this specification 'A' indicates _____.
a) Grade b) Structure
c) Abrasive d) Bond
- 9) Jig and fixture, press tool die can be accurately manufactured by using _____.
a) Center lathe b) EDM wire cut
c) Broaching d) Shaping machine
- 10) Source of energy in Ultrasonic machining process is _____.
a) Electric spark b) Mechanical
c) Chemical d) Electrical
- 11) In case of cylindrical grinding _____.
a) Tool is reciprocating & work is rotary
b) Tool is rotary & work is rotary
c) Tool is reciprocating & work is stationary
d) Tool is stationary & work is reciprocating
- 12) In mechanical machining, material is removed by _____.
a) Erosion b) corrosion
c) Abrasion d) vaporization
- 13) Which of the following work holding device is preferred for shaping a key way in cylindrical shaft?
a) Angle plate b) Dividing head
c) V-block d) Vise
- 14) Metal removing during shaping operation is observed during _____.
a) return stroke b) forward stroke
c) during both stroke d) None of these

Seat No.	
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Set

P

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Manufacturing Technology (BTN02402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) In Section – I, Q. 2 is compulsory. Attempt any two questions from the remaining questions.
 2) In Section – II, Q. 6 is compulsory. Attempt any two questions from the remaining questions.
 3) Figures to right indicate full marks.
 4) Make suitable assumptions, if required and state them clearly.
 5) Use of non-programmable calculator is allowed.

Section – I

- Q.2** a) List the different operations carried out in Lathe machine and explain any four with neat sketch. **05**
 b) Draw neat sketch of Tail stock of Lathe machine and explain in brief. **05**
- Q.3** a) Draw the neat sketch of column type upright drilling machine & explain its working. **04**
 b) Calculate set over distance for taper turning when job has larger diameter 40mm and smaller diameter 30mm and 200mm length. Also draw neat sketch of setup. **05**
- Q.4** a) Explain the construction & working of shaper machine with neat sketch. **05**
 b) Explain the any three operations performed on drilling machines. **04**
- Q.5 Write Short Note (Any Three)** **09**
 a) Tool holding devices in drilling machine
 b) Compare between shaper and planer machine
 c) Advantages, limitations and applications of CNC machine
 d) Steady and follower rest
 e) Pull broaching

Section – II

- Q.6** a) Enlist different types of milling cutters and explain with neat sketch: **05**
 i) Slab mill
 ii) Metal slitting saw
 iii) end mill
 b) Index 6° 40' (Six degrees and forty minutes) on milling machine using dividing head by angular indexing method. **05**
 Use Index plate 1: 15, 16, 17, 18, 19, 20
 Index plate 2: 21, 23, 27, 29, 31, 33
 Index plate 3: 37, 39, 41, 43, 47, 49

- Q.7** **a)** Explain centerless grinding with neat sketch. **04**
 b) Write advantages, limitations and applications of Unconventional machining. **05**
- Q.8** **a)** Explain Electro-discharge machining (EDM) with its working, advantages, limitations and applications. **05**
 b) Explain Glazing, loading, Dressing and truing phenomenon in grinding wheel. **04**
- Q.9** **Write Short Notes. (Any Three)** **09**
 a) up milling and down milling
 b) Grinding wheel specification
 c) Gear shaving
 d) Advantages, limitations and applications of Ultrasonic machining
 e) Direct Indexing

Seat No.	
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MECHANICAL ENGINEERING

Manufacturing Technology (BTN02402)

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Marks: 14

14

- 1) A 46 K 5 V - in this specification 'A' indicates _____.
a) Grade b) Structure
c) Abrasive d) Bond
- 2) Jig and fixture, press tool die can be accurately manufactured by using _____.
a) Center lathe b) EDM wire cut
c) Broaching d) Shaping machine
- 3) Source of energy in Ultrasonic machining process is _____.
a) Electric spark b) Mechanical
c) Chemical d) Electrical
- 4) In case of cylindrical grinding _____.
a) Tool is reciprocating & work is rotary
b) Tool is rotary & work is rotary
c) Tool is reciprocating & work is stationary
d) Tool is stationary & work is reciprocating
- 5) In mechanical machining, material is removed by _____.
a) Erosion b) corrosion
c) Abrasion d) vaporization
- 6) Which of the following work holding device is preferred for shaping a key way in cylindrical shaft?
a) Angle plate b) Dividing head
c) V-block d) Vise
- 7) Metal removing during shaping operation is observed during _____.
a) return stroke b) forward stroke
c) during both strokes d) None of these
- 8) Back gear mechanism is used to _____.
a) reduce the spindle speed
b) rotate the spindle in reverse direction
c) provide power feed to the cutting tool
d) All of the above

- 9) The chuck used for setting up of heavy and irregular shaped work should be _____.
a) Three jaw universal chuck b) four jaw independent chuck
c) Magnetic chuck d) drill chuck
- 10) A reamer is used to correct the _____.
a) size and position of drilled hole b) size and roundness of hole
c) finish and position of drilled hole d) finish and size of a drilled hole
- 11) The work piece motion and tool motion respectively in a horizontal boring machine are _____.
a) stationary and rotational
b) rotational and translational
c) translational and rotational
d) stationary and rotational with translation
- 12) In a planer _____.
a) tool is stationary and the work reciprocates
b) work is stationary and the tool reciprocates
c) tool and work both reciprocates
d) none of the above
- 13) Climb milling is chosen while machining because _____.
a) Chip thickness increases gradually
b) Power consumption is reduced
c) Better surface finish
d) None of above
- 14) An arbor is used to _____.
a) hold the milling cutter b) control the feed motion
c) support milling machine d) guide the job

Seat No.	
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Set	Q
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Manufacturing Technology (BTN02402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:**
- 1) In Section – I, Q. 2 is compulsory. Attempt any two questions from the remaining questions.
 - 2) In Section – II, Q. 6 is compulsory. Attempt any two questions from the remaining questions.
 - 3) Figures to right indicate full marks.
 - 4) Make suitable assumptions, if required and state them clearly.
 - 5) Use of non-programmable calculator is allowed.

Section – I

- | | | |
|------------|---|-----------|
| Q.2 | a) List the different operations carried out in Lathe machine and explain any four with neat sketch. | 05 |
| | b) Draw neat sketch of Tail stock of Lathe machine and explain in brief. | 05 |
| Q.3 | a) Draw the neat sketch of column type upright drilling machine & explain its working. | 04 |
| | b) Calculate set over distance for taper turning when job has larger diameter 40mm and smaller diameter 30mm and 200mm length. Also draw neat sketch of setup. | 05 |
| Q.4 | a) Explain the construction & working of shaper machine with neat sketch. | 05 |
| | b) Explain the any three operations performed on drilling machines. | 04 |
| Q.5 | Write Short Note (Any Three) | 09 |
| | a) Tool holding devices in drilling machine | |
| | b) Compare between shaper and planer machine | |
| | c) Advantages, limitations and applications of CNC machine | |
| | d) Steady and follower rest | |
| | e) Pull broaching | |

Section – II

- | | | |
|------------|---|-----------|
| Q.6 | a) Enlist different types of milling cutters and explain with neat sketch: | 05 |
| | i) Slab mill | |
| | ii) Metal slitting saw | |
| | iii) end mill | |
| | b) Index 6° 40' (Six degrees and forty minutes) on milling machine using dividing head by angular indexing method. | 05 |
| | Use Index plate 1: 15, 16, 17, 18, 19, 20 | |
| | Index plate 2: 21, 23, 27, 29, 31, 33 | |
| | Index plate 3: 37, 39, 41, 43, 47, 49 | |

- Q.7** **a)** Explain centerless grinding with neat sketch. **04**
 b) Write advantages, limitations and applications of Unconventional machining. **05**
- Q.8** **a)** Explain Electro-discharge machining (EDM) with its working, advantages, limitations and applications. **05**
 b) Explain Glazing, loading, Dressing and truing phenomenon in grinding wheel. **04**
- Q.9** **Write Short Notes. (Any Three)** **09**
 a) up milling and down milling
 b) Grinding wheel specification
 c) Gear shaving
 d) Advantages, limitations and applications of Ultrasonic machining
 e) Direct Indexing

Seat No.	
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Set R**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****MECHANICAL ENGINEERING****Manufacturing Technology (BTN02402)**

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
3) Figures to the right indicates full marks.
4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) In case of cylindrical grinding _____.
 - a) Tool is reciprocating & work is rotary
 - b) Tool is rotary & work is rotary
 - c) Tool is reciprocating & work is stationary
 - d) Tool is stationary & work is reciprocating
- 2) In mechanical machining, material is removed by _____.
 - a) Erosion
 - b) corrosion
 - c) Abrasion
 - d) vaporization
- 3) Which of the following work holding device is preferred for shaping a key way in cylindrical shaft?
 - a) Angle plate
 - b) Dividing head
 - c) V-block
 - d) Vise
- 4) Metal removing during shaping operation is observed during _____.
 - a) return stroke
 - b) forward stroke
 - c) during both stroke
 - d) None of these
- 5) Back gear mechanism is used to _____.
 - a) reduce the spindle speed
 - b) rotate the spindle in reverse direction
 - c) provide power feed to the cutting tool
 - d) All of the above
- 6) The chuck used for setting up of heavy and irregular shaped work should be _____.
 - a) Three jaw universal chuck
 - b) four jaw independent chuck
 - c) Magnetic chuck
 - d) drill chuck
- 7) A reamer is used to correct the _____.
 - a) size and position of drilled hole
 - b) size and roundness of hole
 - c) finish and position of drilled hole
 - d) finish and size of a drilled hole

- 8) The work piece motion and tool motion respectively in a horizontal boring machine are _____.
a) stationary and rotational
b) rotational and translational
c) translational and rotational
d) stationary and rotational with translation
- 9) In a planer _____.
a) tool is stationary and the work reciprocates
b) work is stationary and the tool reciprocates
c) tool and work both reciprocates
d) none of the above
- 10) Climb milling is chosen while machining because _____.
a) Chip thickness increases gradually
b) Power consumption is reduced
c) Better surface finish
d) None of above
- 11) An arbor is used to _____.
a) hold the milling cutter
b) control the feed motion
c) support milling machine
d) guide the job
- 12) A 46 K 5 V - in this specification 'A' indicates _____.
a) Grade
b) Structure
c) Abrasive
d) Bond
- 13) Jig and fixture, press tool die can be accurate manufactured by using _____.
a) Center lathe
b) EDM wire cut
c) Broaching
d) Shaping machine
- 14) Source of energy in Ultrasonic machining process is _____.
a) Electric spark
b) Mechanical
c) Chemical
d) Electrical

Seat No.	
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Set	R
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Manufacturing Technology (BTN02402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:**
- 1) In Section – I, Q. 2 is compulsory. Attempt any two questions from the remaining questions.
 - 2) In Section – II, Q. 6 is compulsory. Attempt any two questions from the remaining questions.
 - 3) Figures to right indicate full marks.
 - 4) Make suitable assumptions, if required and state them clearly.
 - 5) Use of non-programmable calculator is allowed.

Section – I

- Q.2**
- a) List the different operations carried out in Lathe machine and explain any four with neat sketch. **05**
 - b) Draw neat sketch of Tail stock of Lathe machine and explain in brief. **05**
- Q.3**
- a) Draw the neat sketch of column type upright drilling machine & explain its working. **04**
 - b) Calculate set over distance for taper turning when job has larger diameter 40mm and smaller diameter 30mm and 200mm length. Also draw neat sketch of setup. **05**
- Q.4**
- a) Explain the construction & working of shaper machine with neat sketch. **05**
 - b) Explain the any three operations performed on drilling machines. **04**
- Q.5 Write Short Note (Any Three) **09****
- a) Tool holding devices in drilling machine
 - b) Compare between shaper and planer machine
 - c) Advantages, limitations and applications of CNC machine
 - d) Steady and follower rest
 - e) Pull broaching

Section – II

- Q.6**
- a) Enlist different types of milling cutters and explain with neat sketch: **05**
 - i) Slab mill
 - ii) Metal slitting saw
 - iii) end mill
 - b) Index 6° 40' (Six degrees and forty minutes) on milling machine using dividing head by angular indexing method. **05**
 Use Index plate 1: 15, 16, 17, 18, 19, 20
 Index plate 2: 21, 23, 27, 29, 31, 33
 Index plate 3: 37, 39, 41, 43, 47, 49

- Q.7** **a)** Explain centerless grinding with neat sketch. **04**
 b) Write advantages, limitations and applications of Unconventional machining. **05**
- Q.8** **a)** Explain Electro-discharge machining (EDM) with its working, advantages, limitations and applications. **05**
 b) Explain Glazing, loading, Dressing and truing phenomenon in grinding wheel. **04**
- Q.9** **Write Short Notes. (Any Three)** **09**
 a) up milling and down milling
 b) Grinding wheel specification
 c) Gear shaving
 d) Advantages, limitations and applications of Ultrasonic machining
 e) Direct Indexing

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

MECHANICAL ENGINEERING**Manufacturing Technology (BTN02402)**

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No. 3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.**14**

- 1) Climb milling is chosen while machining because _____.
 a) Chip thickness increases gradually
 b) Power consumption is reduced
 c) Better surface finish
 d) None of above
- 2) An arbor is used to _____.
 a) hold the milling cutter
 b) control the feed motion
 c) support milling machine
 d) guide the job
- 3) A 46 K 5 V - in this specification 'A' indicates _____.
 a) Grade
 b) Structure
 c) Abrasive
 d) Bond
- 4) Jig and fixture, press tool die can be accurate manufactured by using _____.
 a) Center lathe
 b) EDM wire cut
 c) Broaching
 d) Shaping machine
- 5) Source of energy in Ultrasonic machining process is _____.
 a) Electric spark
 b) Mechanical
 c) Chemical
 d) Electrical
- 6) In case of cylindrical grinding _____.
 a) Tool is reciprocating & work is rotary
 b) Tool is rotary & work is rotary
 c) Tool is reciprocating & work is stationary
 d) Tool is stationary & work is reciprocating
- 7) In mechanical machining, material is removed by _____.
 a) Erosion
 b) corrosion
 c) Abrasion
 d) vaporization
- 8) Which of the following work holding device is preferred for shaping a key way in cylindrical shaft?
 a) Angle plate
 b) Dividing head
 c) V-block
 d) Vise

Seat No.	
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Set	S
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Manufacturing Technology (BTN02402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:**
- 1) In Section – I, Q. 2 is compulsory. Attempt any two questions from the remaining questions.
 - 2) In Section – II, Q. 6 is compulsory. Attempt any two questions from the remaining questions.
 - 3) Figures to right indicate full marks.
 - 4) Make suitable assumptions, if required and state them clearly.
 - 5) Use of non-programmable calculator is allowed.

Section – I

- Q.2**
- a) List the different operations carried out in Lathe machine and explain any four with neat sketch. **05**
 - b) Draw neat sketch of Tail stock of Lathe machine and explain in brief. **05**
- Q.3**
- a) Draw the neat sketch of column type upright drilling machine & explain its working. **04**
 - b) Calculate set over distance for taper turning when job has larger diameter 40mm and smaller diameter 30mm and 200mm length. Also draw neat sketch of setup. **05**
- Q.4**
- a) Explain the construction & working of shaper machine with neat sketch. **05**
 - b) Explain the any three operations performed on drilling machines. **04**
- Q.5 Write Short Note (Any Three) **09****
- a) Tool holding devices in drilling machine
 - b) Compare between shaper and planer machine
 - c) Advantages, limitations and applications of CNC machine
 - d) Steady and follower rest
 - e) Pull broaching

Section – II

- Q.6**
- a) Enlist different types of milling cutters and explain with neat sketch: **05**
 - i) Slab mill
 - ii) Metal slitting saw
 - iii) end mill
 - b) Index 6° 40' (Six degrees and forty minutes) on milling machine using dividing head by angular indexing method. **05**
 Use Index plate 1: 15, 16, 17, 18, 19, 20
 Index plate 2: 21, 23, 27, 29, 31, 33
 Index plate 3: 37, 39, 41, 43, 47, 49

- Q.7** **a)** Explain centerless grinding with neat sketch. **04**
 b) Write advantages, limitations and applications of Unconventional machining. **05**
- Q.8** **a)** Explain Electro-discharge machining (EDM) with its working, advantages, limitations and applications. **05**
 b) Explain Glazing, loading, Dressing and truing phenomenon in grinding wheel. **04**
- Q.9** **Write Short Notes. (Any Three)** **09**
 a) up milling and down milling
 b) Grinding wheel specification
 c) Gear shaving
 d) Advantages, limitations and applications of Ultrasonic machining
 e) Direct Indexing

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) The use of a scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) A streamline is a line
 - a) which is normal to the velocity vector at every point
 - b) which represents lines of constant velocity potential
 - c) which is normal to the lines of constant stream function
 - d) which is tangential to the velocity vector everywhere at a given instant
- 2) If ϕ is a potential in two-dimensional flow the velocity components u and v are defined as

a) $u = \partial\phi/\partial y, v = \partial\phi/\partial x$	b) $u = \partial\phi/\partial x, v = \partial\phi/\partial y$
c) $u = -\partial\phi/\partial x, v = -\partial\phi/\partial y$	d) $u = \partial\phi/\partial y, v = \partial\phi/\partial xy$
- 3) The Venturi meter is advantageous because
 - a) it has a much smaller head loss
 - b) its accuracy is quite good
 - c) its coefficient of discharge is more than for an orifice meter
 - d) all the above
- 4) The equation $P/\rho g + V^2/2g + Z = \text{constant}$ is based on the following assumptions regarding the flow of fluid
 - a) steady, frictionless, incompressible and uniform
 - b) steady, incompressible, uniform and along a streamline
 - c) steady, frictionless, incompressible and along a streamline
 - d) None of these
- 5) According to Darcy's formula, the loss of head due to friction in the pipe is _____.
 where f = coefficient of friction
 l = length of pipe
 v = average velocity of liquid in pipe, and
 d = diameter of pipe

a) $4flv^2/2gd$	b) $flv^2/2gd$
c) $4flV/2gd$	d) $4flv^2/gd$

- 6) The Buckingham-Pi theorem is widely used in the dimensional analysis and expresses the resulting equation in terms of _____.
a) the dependent and independent variables
b) n dimensionless parameters
c) (n - m) dimensionless parameters
d) geometric, kinematic and dynamic variables
- 7) Two pipe systems are said to be equivalent when
a) head loss and discharge are same in two systems
b) length of pipe and discharge are same in two systems
c) friction factor and length are same in two systems
d) length and diameter are same in two systems
- 8) Pelton turbine is _____.
a) Tangential flow
b) Radial flow
c) Axial flow
d) Mixed flow
- 9) In a centrifugal pump, the liquid enters the pump _____.
a) At the center
b) At the bottom
c) At the top
d) From sides
- 10) The center of pressure acting on a vertical plane surface immersed in a liquid will be _____.
a) at the center of gravity
b) above the center of gravity
c) below the center of gravity
d) at the lowest level
- 11) Discharge of a centrifugal pump is _____.
a) Directly proportional to N
b) Inversely proportional to N
c) Directly proportional to N^2
d) Inversely proportional to N^2
- 12) The center of pressure and center of gravity are coincide when _____.
a) vertical surface immersed in the liquid
b) horizontal surface immersed in the liquid
c) inclined surface immersed in the liquid
d) curved surface immersed in the liquid
- 13) Buoyancy acts on a floating body.
a) vertically upward
b) horizontally
c) vertically downward
d) both vertically upward and horizontally
- 14) Hydraulic gradient line takes into consideration
a) potential and kinetic heads only
b) pressure and potential heads only
c) kinetic and pressure heads only
d) potential, kinetic and pressure heads

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Attempt any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if required.
 4) Use of a scientific calculator is allowed.

Section – I

- Q.2** a) With a neat sketch explain the conditions of the equilibrium for submerged body. **04**
 b) Derive an expression for total pressure and center of pressure on a Vertical plane immersed in a liquid. **05**
 c) A rectangular plane surface 3 m wide, 4 m deep lies in water in such a way that the plane makes an angle 30° with the free surface of water. Determine the total pressure force and position of center of pressure when the upper edge is 1.5m below the free surface. **05**
- Q.3** a) What are the different types of fluid flow? Explain with an example. **04**
 b) What is a venturi meter? Derive an expression for the discharge through the venturi meter. **05**
 c) If for a 2-D potential flow, the velocity potential is given by $\Phi = x(2y - 1)$. Determine the velocity at the point P (4, 5). Determine also the value of stream function Ψ at the point 'p'. **05**
- Q.4** a) Explain the different losses that occur in the pipeline connection, with the help of formulae. **04**
 b) Derive the Darcy-Weisbach equation for finding loss of head due to friction in pipes. **05**
 c) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if the coefficient of frictions is 0.005, 0.0052 and 0.0048 respectively, by neglecting minor losses. **05**

Section – II

- Q.5**
- a) Define the drag force and lift force of an object immersed in a fluid. Derive an expression for drag and lift on a stationary solid body in a stream of real fluid moving with uniform velocity. **05**
 - b) The resisting force R of the supersonic plane during the flight can be considered as dependent upon the length of the aeroplane (l), velocity (v), dynamic viscosity (μ), air density (ρ), and bulk modulus (K). Express the functional relationship of these variables and the resisting force using Buckingham's π -theorem **05**
 - c) A flat plate $1.5\text{ m} \times 1.5\text{ m}$ moves at 50 km/hr in a stationary air of density 1.15 kg/m^3 . If the coefficient of drag and lift are 0.15 and 0.75 resp. Determine **04**
 - i) Lift force
 - ii) Drag force
 - iii) Resultant force
 - iv) Power required to keep plate in motion
- Q.6 Solve:**
- a) Classify the hydraulic turbines in detail. **04**
 - b) A Pelton wheel is to be designed for the following specifications: **05**
 Shaft power = 11,772 kW; Head = 380 meters; Speed = 750 r.p.m.; Overall efficiency = 86%; Jet diameter is not to exceed one-sixth of the wheel diameter. Determine:
 - i) The wheel diameter,
 - ii) The number of jets required, and
 - iii) Diameter of the jet. Take $K_{V1} = 0.985$ and $K_{u1} = 0.45$
 - c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and the hub diameter is 1.75 m. The guide blade angle at the extreme edge of the runner is 35° . The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of the whirl is zero at the outlet, determine: **05**
 - i) Runner vane angles at the inlet and outlet at the extreme edge of the runner, and
 - ii) Speed of the turbine
- Q.7**
- a) Explain types of draft tube. What are the functions of the draft tube? **04**
 - b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at the outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm, determine: **05**
 - i) Vane angle at inlet
 - ii) Work done by impeller on water per second, and
 - iii) Manometric efficiency
 - c) Derive the minimum starting speed of centrifugal pump **05**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.
- 5) The use of a scientific calculator is allowed.

Marks: 14

14

- Page 5 of 16

- 8) A streamline is a line
- which is normal to the velocity vector at every point
 - which represents lines of constant velocity potential
 - which is normal to the lines of constant stream function
 - which is tangential to the velocity vector everywhere at a given instant
- 9) If ϕ is a potential in two-dimensional flow the velocity components u and v are defined as
- $u = \partial\phi/\partial y, v = \partial\phi/\partial x$
 - $u = \partial\phi/\partial x, v = \partial\phi/\partial y$
 - $u = -\partial\phi/\partial x, v = -\partial\phi/\partial y$
 - $u = \partial\phi/\partial y, v = \partial\phi/\partial xy$
- 10) The Venturi meter is advantageous because
- it has a much smaller head loss
 - its accuracy is quite good
 - its coefficient of discharge is more than for an orifice meter
 - all the above
- 11) The equation $P/\rho g + V^2/2g + Z = \text{constant}$ is based on the following assumptions regarding the flow of fluid
- steady, frictionless, incompressible and uniform
 - steady, incompressible, uniform and along a streamline
 - steady, frictionless, incompressible and along a streamline
 - None of these
- 12) According to Darcy's formula, the loss of head due to friction in the pipe is _____.
 where f = coefficient of friction
 l = length of pipe
 v = average velocity of liquid in pipe, and
 d = diameter of pipe
- $4flv^2/2gd$
 - $flv^2/2gd$
 - $4flV/2gd$
 - $4flv^2/gd$
- 13) The Buckingham-Pi theorem is widely used in the dimensional analysis and expresses the resulting equation in terms of _____.
 - the dependent and independent variables
 - n dimensionless parameters
 - $(n - m)$ dimensionless parameters
 - geometric, kinematic and dynamic variables
- 14) Two pipe systems are said to be equivalent when
- head loss and discharge are same in two systems
 - length of pipe and discharge are same in two systems
 - friction factor and length are same in two systems
 - length and diameter are same in two systems

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Attempt any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if required.
 4) Use of a scientific calculator is allowed.

Section – I

- Q.2** a) With a neat sketch explain the conditions of the equilibrium for submerged body. **04**
 b) Derive an expression for total pressure and center of pressure on a Vertical plane immersed in a liquid. **05**
 c) A rectangular plane surface 3 m wide, 4 m deep lies in water in such a way that the plane makes an angle 30° with the free surface of water. Determine the total pressure force and position of center of pressure when the upper edge is 1.5m below the free surface. **05**
- Q.3** a) What are the different types of fluid flow? Explain with an example. **04**
 b) What is a venturi meter? Derive an expression for the discharge through the venturi meter. **05**
 c) If for a 2-D potential flow, the velocity potential is given by $\Phi = x(2y - 1)$. Determine the velocity at the point P (4, 5). Determine also the value of stream function Ψ at the point 'p'. **05**
- Q.4** a) Explain the different losses that occur in the pipeline connection, with the help of formulae. **04**
 b) Derive the Darcy-Weisbach equation for finding loss of head due to friction in pipes. **05**
 c) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if the coefficient of frictions is 0.005, 0.0052 and 0.0048 respectively, by neglecting minor losses. **05**

Section – II

- Q.5**
- a) Define the drag force and lift force of an object immersed in a fluid. Derive an expression for drag and lift on a stationary solid body in a stream of real fluid moving with uniform velocity. **05**
 - b) The resisting force R of the supersonic plane during the flight can be considered as dependent upon the length of the aeroplane (l), velocity (v), dynamic viscosity (μ), air density (ρ), and bulk modulus (K). Express the functional relationship of these variables and the resisting force using Buckingham's π -theorem **05**
 - c) A flat plate $1.5\text{ m} \times 1.5\text{ m}$ moves at 50 km/hr in a stationary air of density 1.15 kg/m^3 . If the coefficient of drag and lift are 0.15 and 0.75 resp. Determine **04**
 - i) Lift force
 - ii) Drag force
 - iii) Resultant force
 - iv) Power required to keep plate in motion
- Q.6 Solve:**
- a) Classify the hydraulic turbines in detail. **04**
 - b) A Pelton wheel is to be designed for the following specifications: **05**
 Shaft power = 11,772 kW; Head = 380 meters; Speed = 750 r.p.m.; Overall efficiency = 86%; Jet diameter is not to exceed one-sixth of the wheel diameter. Determine:
 - i) The wheel diameter,
 - ii) The number of jets required, and
 - iii) Diameter of the jet. Take $K_{V1} = 0.985$ and $K_{u1} = 0.45$
 - c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and the hub diameter is 1.75 m. The guide blade angle at the extreme edge of the runner is 35° . The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of the whirl is zero at the outlet, determine: **05**
 - i) Runner vane angles at the inlet and outlet at the extreme edge of the runner, and
 - ii) Speed of the turbine
- Q.7**
- a) Explain types of draft tube. What are the functions of the draft tube? **04**
 - b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at the outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm, determine: **05**
 - i) Vane angle at inlet
 - ii) Work done by impeller on water per second, and
 - iii) Manometric efficiency
 - c) Derive the minimum starting speed of centrifugal pump **05**

Seat No.	
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Set R

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) The use of a scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Discharge of a centrifugal pump is _____.
 a) Directly proportional to N b) Inversely proportional to N
 c) Directly proportional to N^2 d) Inversely proportional to N^2
- 2) The center of pressure and center of gravity are coincide when _____.
 a) vertical surface immersed in the liquid
 b) horizontal surface immersed in the liquid
 c) inclined surface immersed in the liquid
 d) curved surface immersed in the liquid
- 3) Buoyancy acts on a floating body.
 a) vertically upward
 b) horizontally
 c) vertically downward
 d) both vertically upward and horizontally
- 4) Hydraulic gradient line takes into consideration
 a) potential and kinetic heads only
 b) pressure and potential heads only
 c) kinetic and pressure heads only
 d) potential, kinetic and pressure heads
- 5) A streamline is a line
 a) which is normal to the velocity vector at every point
 b) which represents lines of constant velocity potential
 c) which is normal to the lines of constant stream function
 d) which is tangential to the velocity vector everywhere at a given instant
- 6) If ϕ is a potential in two-dimensional flow the velocity components u and v are defined as
 a) $u = \partial\phi/\partial y, v = \partial\phi/\partial x$ b) $u = \partial\phi/\partial x, v = \partial\phi/\partial y$
 c) $u = -\partial\phi/\partial x, v = -\partial\phi/\partial y$ d) $u = \partial\phi/\partial y, v = \partial\phi/\partial xy$

- 7) The Venturi meter is advantageous because
- it has a much smaller head loss
 - its accuracy is quite good
 - its coefficient of discharge is more than for an orifice meter
 - all the above
- 8) The equation $P/\rho g + V^2/2g + Z = \text{constant}$ is based on the following assumptions regarding the flow of fluid
- steady, frictionless, incompressible and uniform
 - steady, incompressible, uniform and along a streamline
 - steady, frictionless, incompressible and along a streamline
 - None of these
- 9) According to Darcy's formula, the loss of head due to friction in the pipe is _____.
 where f = coefficient of friction
 l = length of pipe
 v = average velocity of liquid in pipe, and
 d = diameter of pipe
- $4flv^2/2gd$
 - $flv^2/2gd$
 - $4flV/2gd$
 - $4flv^2/gd$
- 10) The Buckingham-Pi theorem is widely used in the dimensional analysis and expresses the resulting equation in terms of _____.
 - the dependent and independent variables
 - n dimensionless parameters
 - $(n - m)$ dimensionless parameters
 - geometric, kinematic and dynamic variables
- 11) Two pipe systems are said to be equivalent when
- head loss and discharge are same in two systems
 - length of pipe and discharge are same in two systems
 - friction factor and length are same in two systems
 - length and diameter are same in two systems
- 12) Pelton turbine is _____.
 - Tangential flow
 - Radial flow
 - Axial flow
 - Mixed flow
- 13) In a centrifugal pump, the liquid enters the pump _____.
 - At the center
 - At the bottom
 - At the top
 - From sides
- 14) The center of pressure acting on a vertical plane surface immersed in a liquid will be _____.
 - at the center of gravity
 - above the center of gravity
 - below the center of gravity
 - at the lowest level

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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Attempt any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if required.
 4) Use of a scientific calculator is allowed.

Section – I

- Q.2** a) With a neat sketch explain the conditions of the equilibrium for submerged body. **04**
 b) Derive an expression for total pressure and center of pressure on a Vertical plane immersed in a liquid. **05**
 c) A rectangular plane surface 3 m wide, 4 m deep lies in water in such a way that the plane makes an angle 30° with the free surface of water. Determine the total pressure force and position of center of pressure when the upper edge is 1.5m below the free surface. **05**
- Q.3** a) What are the different types of fluid flow? Explain with an example. **04**
 b) What is a venturi meter? Derive an expression for the discharge through the venturi meter. **05**
 c) If for a 2-D potential flow, the velocity potential is given by $\Phi = x(2y - 1)$. Determine the velocity at the point P (4, 5). Determine also the value of stream function Ψ at the point 'p'. **05**
- Q.4** a) Explain the different losses that occur in the pipeline connection, with the help of formulae. **04**
 b) Derive the Darcy-Weisbach equation for finding loss of head due to friction in pipes. **05**
 c) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if the coefficient of frictions is 0.005, 0.0052 and 0.0048 respectively, by neglecting minor losses. **05**

Section – II

- Q.5**
- a) Define the drag force and lift force of an object immersed in a fluid. Derive an expression for drag and lift on a stationary solid body in a stream of real fluid moving with uniform velocity. **05**
 - b) The resisting force R of the supersonic plane during the flight can be considered as dependent upon the length of the aeroplane (l), velocity (v), dynamic viscosity (μ), air density (ρ), and bulk modulus (K). Express the functional relationship of these variables and the resisting force using Buckingham's π -theorem **05**
 - c) A flat plate $1.5\text{ m} \times 1.5\text{ m}$ moves at 50 km/hr in a stationary air of density 1.15 kg/m^3 . If the coefficient of drag and lift are 0.15 and 0.75 resp. Determine **04**
 - i) Lift force
 - ii) Drag force
 - iii) Resultant force
 - iv) Power required to keep plate in motion
- Q.6 Solve:**
- a) Classify the hydraulic turbines in detail. **04**
 - b) A Pelton wheel is to be designed for the following specifications: **05**
 Shaft power = 11,772 kW; Head = 380 meters; Speed = 750 r.p.m.; Overall efficiency = 86%; Jet diameter is not to exceed one-sixth of the wheel diameter. Determine:
 - i) The wheel diameter,
 - ii) The number of jets required, and
 - iii) Diameter of the jet. Take $K_{V1} = 0.985$ and $K_{u1} = 0.45$
 - c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and the hub diameter is 1.75 m. The guide blade angle at the extreme edge of the runner is 35° . The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of the whirl is zero at the outlet, determine: **05**
 - i) Runner vane angles at the inlet and outlet at the extreme edge of the runner, and
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- Q.7**
- a) Explain types of draft tube. What are the functions of the draft tube? **04**
 - b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at the outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm, determine: **05**
 - i) Vane angle at inlet
 - ii) Work done by impeller on water per second, and
 - iii) Manometric efficiency
 - c) Derive the minimum starting speed of centrifugal pump **05**

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MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

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Duration: 30 Minutes

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 - $flv^2/2gd$
 - $4flV/2gd$
 - $4flv^2/gd$

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Set **S**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Fluid Mechanics & Fluid Machines (BTN02403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Attempt any two questions from each section.
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Section – I

- Q.2** a) With a neat sketch explain the conditions of the equilibrium for submerged body. **04**
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- Q.4** a) Explain the different losses that occur in the pipeline connection, with the help of formulae. **04**
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 c) The difference in water surface levels in two tanks, which are connected by three pipes in series of lengths 300 m, 170 m and 210 m and of diameters 300 mm, 200 mm and 400 mm respectively, is 12 m. Determine the rate of flow of water if the coefficient of frictions is 0.005, 0.0052 and 0.0048 respectively, by neglecting minor losses. **05**

Section – II

- Q.5**
- a) Define the drag force and lift force of an object immersed in a fluid. Derive an expression for drag and lift on a stationary solid body in a stream of real fluid moving with uniform velocity. **05**
 - b) The resisting force R of the supersonic plane during the flight can be considered as dependent upon the length of the aeroplane (l), velocity (v), dynamic viscosity (μ), air density (ρ), and bulk modulus (K). Express the functional relationship of these variables and the resisting force using Buckingham's π -theorem **05**
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 - ii) The number of jets required, and
 - iii) Diameter of the jet. Take $K_{V1} = 0.985$ and $K_{u1} = 0.45$
 - c) A Kaplan turbine working under a head of 20 m develops 11772 kW shaft power. The outer diameter of the runner is 3.5 m and the hub diameter is 1.75 m. The guide blade angle at the extreme edge of the runner is 35° . The hydraulic and overall efficiencies of the turbines are 88% and 84% respectively. If the velocity of the whirl is zero at the outlet, determine: **05**
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- Q.7**
- a) Explain types of draft tube. What are the functions of the draft tube? **04**
 - b) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r.p.m. works against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at the outlet. If the outer diameter of the impeller is 500 mm and width at outlet is 50 mm, determine: **05**
 - i) Vane angle at inlet
 - ii) Work done by impeller on water per second, and
 - iii) Manometric efficiency
 - c) Derive the minimum starting speed of centrifugal pump **05**

Seat No.	
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Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to right indicates full marks.

Marks: 14

14

- Page 1 of 16

- 7) The cam follower generally used in automobile engines is _____.
a) knife edge follower b) flat faced follower
c) spherical faced follower d) roller follower
- 8) The size of a gear is usually specified by _____.
a) pressure angle b) circular pitch
c) diametral pitch d) pitch circle diameter
- 9) The radial distance of a tooth from the pitch circle to the bottom of the tooth, is called _____.
a) Dedendum b) Addendum
c) Clearance d) Working depth
- 10) The product of the diametral pitch and circular pitch is equal to _____.
a) 1 b) $1/\pi$
c) π d) 2π
- 11) A Hartnell governor is a _____.
a) pendulum type governor b) spring loaded governor
c) dead weight governor d) inertia governor
- 12) The force resisting the outward movement of balls is known as _____ of the governor.
a) Effort b) Centripetal force
c) Controlling force d) Inertia force
- 13) For dynamic balancing of a shaft, _____.
a) the net dynamic force acting on the shaft is equal to zero
b) the net couple due to dynamic forces acting on the shaft is equal to zero
c) both (a) and (b)
d) none of the above
- 14) In order to have a complete balance of the several revolving masses in different planes _____.
a) the resultant force must be zero
b) the resultant couple must be zero
c) both the resultant force and couple must be zero
d) none of the above

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Kinematics & Theory of Machines (BTN02404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) Attempt any two questions from each section.
 2) Figures to right indicates full marks.

Section – I

- Q.2 a)** Define the term kinematic pair. Classify the kinematic pairs. Explain two types of kinematic pairs. **06**
- b)** In a four-bar chain ABCD as shown in Fig. I, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of the link CD when angle BAD = 60°. **08**

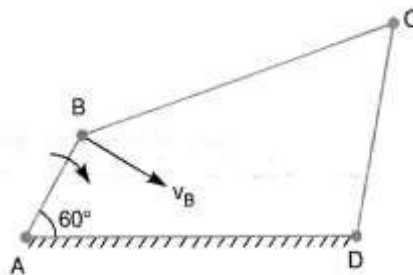
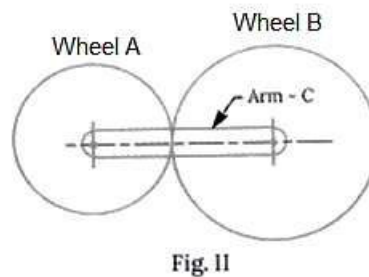


Fig. I

- Q.3 a)** What is inversion of mechanism? Explain two inversions of a slider crank mechanism. **06**
- b)** Explain with neat sketches different types of cams and followers. **08**
- Q.4 a)** What is rubbing velocity at a pin joint. What will be the rubbing velocity at the pin joint when the two links move in the same and opposite directions? **04**
- b)** A cam is to be designed for a knife edge follower with the following data: **10**
- Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion
 - Dwell for the next 30°.
 - During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.
 - Dwell during the remaining 180°.
- Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

Section – II

- Q.5 a)** Define the following terms: **06**
- Addendum
 - Dedendum
 - Pitch circle
 - Circular pitch
 - Module
 - Diametral pitch
- b)** In an epicyclic gear train as shown in Fig. II, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the center of the gear A which is fixed. Determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? **08**



- Q.6 a)** What is the function of governor? How does it differ from the flywheel. Also, state different types of governors. **06**
- b)** The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. **08**
- Q.7 a)** What is static and dynamic balancing? State and explain the necessary conditions to achieve them. **04**
- b)** A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Seat No.	
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Day & Date: Tuesday, 28-05-2024
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Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The size of a gear is usually specified by _____.
a) pressure angle b) circular pitch
c) diametral pitch d) pitch circle diameter
- 2) The radial distance of a tooth from the pitch circle to the bottom of the tooth, is called _____.
a) Dedendum b) Addendum
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- 3) The product of the diametral pitch and circular pitch is equal to _____.
a) 1 b) $1/\pi$
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- 4) A Hartnell governor is a _____.
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c) both (a) and (b)
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- 7) In order to have a complete balance of the several revolving masses in different planes _____.
a) the resultant force must be zero
b) the resultant couple must be zero
c) both the resultant force and couple must be zero
d) none of the above

- 8) In a reciprocating steam engine, which of the following forms a kinematic link?
- cylinder and piston
 - piston rod and connecting rod
 - crankshaft and flywheel
 - flywheel and engine frame
- 9) The motion of a piston in the cylinder of a steam engine is an example of ____.
- completely constrained motion
 - incompletely constrained motion
 - successfully constrained motion
 - none of these
- 10) The two links OA and OB are connected by a pin joint at O. If the link OA turns with angular velocity ω_1 rad/s in the clockwise direction and the link OB turns with angular velocity ω_2 rad/s in the anti-clockwise direction, then the rubbing velocity at the pin joint O is ____.
- $\omega_1 \cdot \omega_2 r$
 - $(\omega_1 - \omega_2)r$
 - $(\omega_1 + \omega_2)r$
 - $(\omega_1 - \omega_2)2r$
- where r = Radius of the pin at O
- 11) The component of the acceleration, parallel to the velocity of the particle, at the given instant is called ____.
- Radial component
 - Tangential component
 - Coriolis component
 - none of these
- 12) The direction of linear velocity of any point on a link with respect to another point on the same link is ____.
- parallel to the link joining the points
 - perpendicular to the link joining the points
 - at 45° to the link joining the points
 - none of these
- 13) A circle drawn with center as the cam centre and radius equal to the distance between the cam center and the point on the pitch curve at which the pressure angle is maximum, is called ____.
- base circle
 - pitch circle
 - prime circle
 - none of these
- 14) The cam follower generally used in automobile engines is ____.
- knife edge follower
 - flat faced follower
 - spherical faced follower
 - roller follower

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Kinematics & Theory of Machines (BTN02404)

Day & Date: Tuesday, 28-05-2024
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- b)** In a four-bar chain ABCD as shown in Fig. I, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of the link CD when angle BAD = 60°. **08**

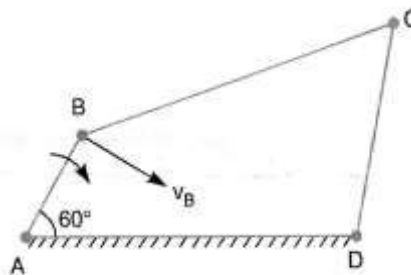
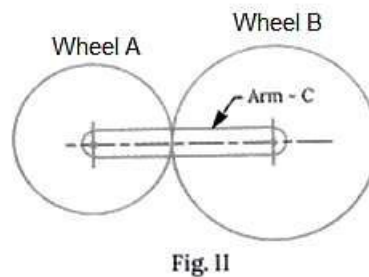


Fig. I

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Section – II

- Q.5 a)** Define the following terms: **06**
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- b)** In an epicyclic gear train as shown in Fig. II, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the center of the gear A which is fixed. Determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? **08**



- Q.6 a)** What is the function of governor? How does it differ from the flywheel. Also, state different types of governors. **06**
- b)** The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. **08**
- Q.7 a)** What is static and dynamic balancing? State and explain the necessary conditions to achieve them. **04**
- b)** A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Seat No.	
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Set	R
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Kinematics & Theory of Machines (BTN02404)

Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
3) Figures to right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) A Hartnell governor is a _____.
a) pendulum type governor b) spring loaded governor
c) dead weight governor d) inertia governor
- 2) The force resisting the outward movement of balls is known as _____ of the governor.
a) Effort b) Centripetal force
c) Controlling force d) Inertia force
- 3) For dynamic balancing of a shaft, _____.
a) the net dynamic force acting on the shaft is equal to zero
b) the net couple due to dynamic forces acting on the shaft is equal to zero
c) both (a) and (b)
d) none of the above
- 4) In order to have a complete balance of the several revolving masses in different planes _____.
a) the resultant force must be zero
b) the resultant couple must be zero
c) both the resultant force and couple must be zero
d) none of the above
- 5) In a reciprocating steam engine, which of the following forms a kinematic link?
a) cylinder and piston b) piston rod and connecting rod
c) crankshaft and flywheel d) flywheel and engine frame
- 6) The motion of a piston in the cylinder of a steam engine is an example of _____.
a) completely constrained motion
b) incompletely constrained motion
c) successfully constrained motion
d) none of these

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Kinematics & Theory of Machines (BTN02404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) Attempt any two questions from each section.
 2) Figures to right indicates full marks.

Section – I

- Q.2** a) Define the term kinematic pair. Classify the kinematic pairs. Explain two types of kinematic pairs. **06**
- b) In a four-bar chain ABCD as shown in Fig. I, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of the link CD when angle BAD = 60°. **08**

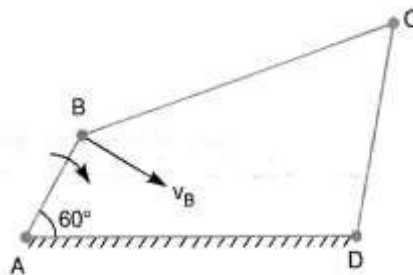
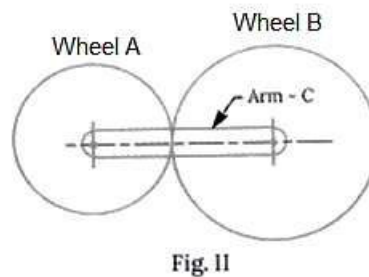


Fig. I

- Q.3** a) What is inversion of mechanism? Explain two inversions of a slider crank mechanism. **06**
- b) Explain with neat sketches different types of cams and followers. **08**
- Q.4** a) What is rubbing velocity at a pin joint. What will be the rubbing velocity at the pin joint when the two links move in the same and opposite directions? **04**
- b) A cam is to be designed for a knife edge follower with the following data: **10**
- Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion
 - Dwell for the next 30°.
 - During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.
 - Dwell during the remaining 180°.
- Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

Section – II

- Q.5 a)** Define the following terms: **06**
- Addendum
 - Dedendum
 - Pitch circle
 - Circular pitch
 - Module
 - Diametral pitch
- b)** In an epicyclic gear train as shown in Fig. II, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the center of the gear A which is fixed. Determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? **08**



- Q.6 a)** What is the function of governor? How does it differ from the flywheel. Also, state different types of governors. **06**
- b)** The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. **08**
- Q.7 a)** What is static and dynamic balancing? State and explain the necessary conditions to achieve them. **04**
- b)** A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Seat No.	
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Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to right indicates full marks.

Marks: 14

14

- Page 13 of 16

- 9) In order to have a complete balance of the several revolving masses in different planes _____.
a) the resultant force must be zero
b) the resultant couple must be zero
c) both the resultant force and couple must be zero
d) none of the above
- 10) In a reciprocating steam engine, which of the following forms a kinematic link?
a) cylinder and piston
b) piston rod and connecting rod
c) crankshaft and flywheel
d) flywheel and engine frame
- 11) The motion of a piston in the cylinder of a steam engine is an example of _____.
a) completely constrained motion
b) incompletely constrained motion
c) successfully constrained motion
d) none of these
- 12) The two links OA and OB are connected by a pin joint at O. If the link OA turns with angular velocity ω_1 rad/s in the clockwise direction and the link OB turns with angular velocity ω_2 rad/s in the anti-clockwise direction, then the rubbing velocity at the pin joint O is _____.
a) $\omega_1 \cdot \omega_2 r$
b) $(\omega_1 - \omega_2)r$
c) $(\omega_1 + \omega_2)r$
d) $(\omega_1 - \omega_2)2r$
where r = Radius of the pin at O
- 13) The component of the acceleration, parallel to the velocity of the particle, at the given instant is called _____.
a) Radial component
b) Tangential component
c) Coriolis component
d) none of these
- 14) The direction of linear velocity of any point on a link with respect to another point on the same link is _____.
a) parallel to the link joining the points
b) perpendicular to the link joining the points
c) at 45° to the link joining the points
d) none of these

Seat No.	
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Set	S
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Kinematics & Theory of Machines (BTN02404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) Attempt any two questions from each section.
 2) Figures to right indicates full marks.

Section – I

- Q.2** a) Define the term kinematic pair. Classify the kinematic pairs. Explain two types of kinematic pairs. **06**
- b) In a four-bar chain ABCD as shown in Fig. I, AD is fixed and is 150 mm long. The crank AB is 40 mm long and rotates at 120 r.p.m. clockwise, while the link CD = 80 mm oscillates about D. BC and AD are of equal length. Find the angular velocity of the link CD when angle BAD = 60°. **08**

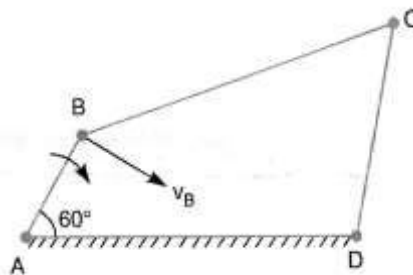
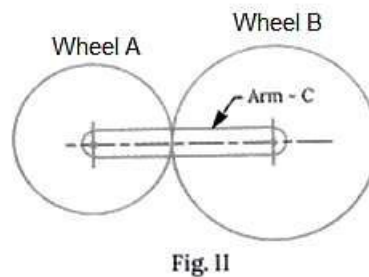


Fig. I

- Q.3** a) What is inversion of mechanism? Explain two inversions of a slider crank mechanism. **06**
- b) Explain with neat sketches different types of cams and followers. **08**
- Q.4** a) What is rubbing velocity at a pin joint. What will be the rubbing velocity at the pin joint when the two links move in the same and opposite directions? **04**
- b) A cam is to be designed for a knife edge follower with the following data: **10**
- Cam lift = 40 mm during 90° of cam rotation with simple harmonic motion
 - Dwell for the next 30°.
 - During the next 60° of cam rotation, the follower returns to its original position with simple harmonic motion.
 - Dwell during the remaining 180°.
- Draw the profile of the cam when the line of stroke of the follower passes through the axis of the cam shaft. The radius of the base circle of the cam is 40 mm. Determine the maximum velocity and acceleration of the follower during its ascent and descent, if the cam rotates at 240 r.p.m.

Section – II

- Q.5 a)** Define the following terms: **06**
- i) Addendum
 - ii) Dedendum
 - iii) Pitch circle
 - iv) Circular pitch
 - v) Module
 - vi) Diametral pitch
- b)** In an epicyclic gear train as shown in Fig. II, an arm carries two gears A and B having 36 and 45 teeth respectively. If the arm rotates at 150 r.p.m. in the anticlockwise direction about the center of the gear A which is fixed. Determine the speed of gear B. If the gear A instead of being fixed, makes 300 r.p.m. in the clockwise direction, what will be the speed of gear B? **08**



- Q.6 a)** What is the function of governor? How does it differ from the flywheel. Also, state different types of governors. **06**
- b)** The arms of a Porter governor are each 250 mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass of the central sleeve is 30 kg. The radius of rotation of the balls is 150 mm when the sleeve begins to rise and reaches a value of 200 mm for maximum speed. Determine the speed range of the governor. If the friction at the sleeve is equivalent of 20 N of load at the sleeve, determine how the speed range is modified. **08**
- Q.7 a)** What is static and dynamic balancing? State and explain the necessary conditions to achieve them. **04**
- b)** A, B, C and D are four masses carried by a rotating shaft at radii 100, 125, 200 and 150 mm respectively. The planes in which the masses revolve are spaced 600 mm apart and the mass of B, C and D are 10 kg, 5 kg, and 4 kg respectively. Find the required mass A and the relative angular settings of the four masses so that the shaft shall be in complete balance. **10**

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechatronic Systems (BTN02408)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
3) Figures to the right indicates full marks.
4) Assume suitable data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) ABS stands for _____.
a) Anti-lock barrier system b) Anti-lock breaking system
c) Arm locking system d) Anti-lock braking system
- 2) Who invented 'mechatronics' term?
a) Henry Ford b) Yascava Cooperation
c) Tetsura Mori d) None of the above
- 3) Any inductive device such as LVDT is based on _____ law.
a) Lorentz b) Newton
c) Tesla d) Faraday's
- 4) Wheatstone bridge can be used _____.
a) To convert voltage change to resistance change
b) To convert current change to temperature change
c) To convert electrical resistance change to voltage change
d) None of the above
- 5) How many timers exist in 8051 which is 16-bit?
a) 4 b) 2
c) 8 d) 1
- 6) Which of the following circuit is used as a special signal to demultiplex the address bus and data bus?
a) Priority Encoder b) Decoder
c) Address Latch Enable d) Demultiplexer
- 7) Random access memory holds _____ bytes of storage in 8051.
a) 126 b) 128
c) 256 d) 324
- 8) An Arduino uno has _____ OUTPUT pins
a) 14 b) 6
c) 8 d) 5

- 9) Raspberry Pi is a series of _____.
a) Microprocessor b) Microcontroller
c) Logic Gate d) Micro Computers
- 10) When device provides a current it is called as _____ current.
a) Sourcing b) Sinking
c) Both a & b d) None of these
- 11) PLC program is written in _____.
a) PLC diagram b) Multiplexer diagram
c) Ladder diagram d) None of the above
- 12) In this topology if central hub fails the entire system fails _____.
a) Mesh b) Ring
c) Star d) Tree
- 13) The _____ of a transducer is the ability to give the same output when used to measure a constant input over a period of time.
a) Resolution b) Repeatability
c) Response time d) Stability
- 14) In _____ mode, both stations can transmit and receive simultaneously.
a) Simplex b) Half Duplex
c) Full Duplex d) None of these

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechatronic Systems (BTN02408)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Make suitable assumptions, if required and state them clearly.

Section – I

Q.2 Solve any four questions **16**

- a) Explain the system for pressure measurement with strain gauge.
- b) What is Industry 4.0? Explain different elements of Industry 4.0
- c) Define Active & Passive Sensors. Give two examples each.
- d) What are the selection criteria for the sensor?
- e) Draw pin diagram of 8051. write down function of EA pin.

Q.3 Solve any two questions **12**

- a) Draw architecture of 8085. Write function of pin READY & HOLD.
- b) Interface DC motor with Arduino & Write C program to rotate motor clockwise & anti clockwise with brake on both side.
- c) State Different Types of Flow Meters. Explain operation of ultrasonic Flow Meters in details.

Section – II

Q.4 Solve any four questions **16**

- a) Compare RS 232, RS 422, RS 485 on any four points.
- b) Explain necessity of signal conditioning in mechatronics system. State different operations or process involved in signal conditioning.
- c) What is SCADA. Write note on different elements of SCADA
- d) Write a short note on Ladder programming in PLC.
- f) Explain H-bridge operation of motor driver for rotation of DC motor.

Q.5 Solve any two questions. **12**

- a) Write a note on LAN, MAN & WAN.
- b) Explain the seven layered OSI model.
- c) Explain Logical OR, AND & NAND functions in PLC programming.

Seat No.	
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- 10) Any inductive device such as LVDT is based on _____ law.
a) Lorentz
b) Newton
c) Tesla
d) Faraday's
- 11) Wheatstone bridge can be used _____.
a) To convert voltage change to resistance change
b) To convert current change to temperature change
c) To convert electrical resistance change to voltage change
d) None of the above
- 12) How many timers exist in 8051 which is 16-bit?
a) 4
b) 2
c) 8
d) 1
- 13) Which of the following circuit is used as a special signal to demultiplex the address bus and data bus?
a) Priority Encoder
b) Decoder
c) Address Latch Enable
d) Demultiplexer
- 14) Random access memory holds _____ bytes of storage in 8051.
a) 126
b) 128
c) 256
d) 324

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechatronic Systems (BTN02408)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Make suitable assumptions, if required and state them clearly.

Section – I

- Q.2 Solve any four questions** **16**
- a) Explain the system for pressure measurement with strain gauge.
 - b) What is Industry 4.0? Explain different elements of Industry 4.0
 - c) Define Active & Passive Sensors. Give two examples each.
 - d) What are the selection criteria for the sensor?
 - e) Draw pin diagram of 8051. write down function of EA pin.
- Q.3 Solve any two questions** **12**
- a) Draw architecture of 8085. Write function of pin READY & HOLD.
 - b) Interface DC motor with Arduino & Write C program to rotate motor clockwise & anti clockwise with brake on both side.
 - c) State Different Types of Flow Meters. Explain operation of ultrasonic Flow Meters in details.

Section – II

- Q.4 Solve any four questions** **16**
- a) Compare RS 232, RS 422, RS 485 on any four points.
 - b) Explain necessity of signal conditioning in mechatronics system. State different operations or process involved in signal conditioning.
 - c) What is SCADA. Write note on different elements of SCADA
 - d) Write a short note on Ladder programming in PLC.
 - f) Explain H-bridge operation of motor driver for rotation of DC motor.
- Q.5 Solve any two questions.** **12**
- a) Write a note on LAN, MAN & WAN.
 - b) Explain the seven layered OSI model.
 - c) Explain Logical OR, AND & NAND functions in PLC programming.

Seat No.	
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Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if required.

Marks: 14

14

- 1) PLC program is written in _____.
a) PLC diagram
b) Multiplexer diagram
c) Ladder diagram
d) None of the above
- 2) In this topology if central hub fails the entire system fails _____.
a) Mesh
b) Ring
c) Star
d) Tree
- 3) The _____ of a transducer is the ability to give the same output when used to measure a constant input over a period of time.
a) Resolution
b) Repeatability
c) Response time
d) Stability
- 4) In _____ mode, both stations can transmit and receive simultaneously.
a) Simplex
b) Half Duplex
c) Full Duplex
d) None of these
- 5) ABS stands for _____.
a) Anti-lock barrier system
b) Anti-lock breaking system
c) Arm locking system
d) Anti-lock braking system
- 6) Who invented 'mechatronics' term?
a) Henry Ford
b) Yascava Cooperation
c) Tetsura Mori
d) None of the above
- 7) Any inductive device such as LVDT is based on _____ law.
a) Lorentz
b) Newton
c) Tesla
d) Faraday's
- 8) Wheatstone bridge can be used _____.
a) To convert voltage change to resistance change
b) To convert current change to temperature change
c) To convert electrical resistance change to voltage change
d) None of the above

- 9) How many timers exist in 8051 which is 16-bit?
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b) 2
c) 8
d) 1
- 10) Which of the following circuit is used as a special signal to demultiplex the address bus and data bus?
a) Priority Encoder
b) Decoder
c) Address Latch Enable
d) Demultiplexer
- 11) Random access memory holds _____ bytes of storage in 8051.
a) 126
b) 128
c) 256
d) 324
- 12) An Arduino uno has _____ OUTPUT pins
a) 14
b) 6
c) 8
d) 5
- 13) Raspberry Pi is a series of _____.
a) Microprocessor
b) Microcontroller
c) Logic Gate
d) Micro Computers
- 14) When device provides a current it is called as _____ current.
a) Sourcing
b) Sinking
c) Both a & b
d) None of these

Seat No.	
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Set	R
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechatronic Systems (BTN02408)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Make suitable assumptions, if required and state them clearly.

Section – I

- Q.2 Solve any four questions** **16**
- a) Explain the system for pressure measurement with strain gauge.
 - b) What is Industry 4.0? Explain different elements of Industry 4.0
 - c) Define Active & Passive Sensors. Give two examples each.
 - d) What are the selection criteria for the sensor?
 - e) Draw pin diagram of 8051. write down function of EA pin.
- Q.3 Solve any two questions** **12**
- a) Draw architecture of 8085. Write function of pin READY & HOLD.
 - b) Interface DC motor with Arduino & Write C program to rotate motor clockwise & anti clockwise with brake on both side.
 - c) State Different Types of Flow Meters. Explain operation of ultrasonic Flow Meters in details.

Section – II

- Q.4 Solve any four questions** **16**
- a) Compare RS 232, RS 422, RS 485 on any four points.
 - b) Explain necessity of signal conditioning in mechatronics system. State different operations or process involved in signal conditioning.
 - c) What is SCADA. Write note on different elements of SCADA
 - d) Write a short note on Ladder programming in PLC.
 - f) Explain H-bridge operation of motor driver for rotation of DC motor.
- Q.5 Solve any two questions.** **12**
- a) Write a note on LAN, MAN & WAN.
 - b) Explain the seven layered OSI model.
 - c) Explain Logical OR, AND & NAND functions in PLC programming.

Seat No.	
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Set	S
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechatronic Systems (BTN02408)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
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 - 3) Figures to the right indicates full marks.
 - 4) Assume suitable data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options. **14**

- 1) Which of the following circuit is used as a special signal to demultiplex the address bus and data bus?

a) Priority Encoder	b) Decoder
c) Address Latch Enable	d) Demultiplexer
- 2) Random access memory holds _____ bytes of storage in 8051.

a) 126	b) 128
c) 256	d) 324
- 3) An Arduino uno has _____ OUTPUT pins

a) 14	b) 6
c) 8	d) 5
- 4) Raspberry Pi is a series of _____.

a) Microprocessor	b) Microcontroller
c) Logic Gate	d) Micro Computers
- 5) When device provides a current it is called as _____ current.

a) Sourcing	b) Sinking
c) Both a & b	d) None of these
- 6) PLC program is written in _____.

a) PLC diagram	b) Multiplexer diagram
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a) Mesh	b) Ring
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- 8) The _____ of a transducer is the ability to give the same output when used to measure a constant input over a period of time.

a) Resolution	b) Repeatability
c) Response time	d) Stability
- 9) In _____ mode, both stations can transmit and receive simultaneously.

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- 10)** ABS stands for _____.
a) Anti-lock barrier system b) Anti-lock breaking system
c) Arm locking system d) Anti-lock braking system
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a) Lorentz b) Newton
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- 13)** Wheatstone bridge can be used _____.
a) To convert voltage change to resistance change
b) To convert current change to temperature change
c) To convert electrical resistance change to voltage change
d) None of the above
- 14)** How many timers exist in 8051 which is 16-bit?
a) 4 b) 2
c) 8 d) 1

Seat No.	
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Set	S
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Mechatronic Systems (BTN02408)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Make suitable assumptions, if required and state them clearly.

Section – I

Q.2 Solve any four questions **16**

- a) Explain the system for pressure measurement with strain gauge.
- b) What is Industry 4.0? Explain different elements of Industry 4.0
- c) Define Active & Passive Sensors. Give two examples each.
- d) What are the selection criteria for the sensor?
- e) Draw pin diagram of 8051. write down function of EA pin.

Q.3 Solve any two questions **12**

- a) Draw architecture of 8085. Write function of pin READY & HOLD.
- b) Interface DC motor with Arduino & Write C program to rotate motor clockwise & anti clockwise with brake on both side.
- c) State Different Types of Flow Meters. Explain operation of ultrasonic Flow Meters in details.

Section – II

Q.4 Solve any four questions **16**

- a) Compare RS 232, RS 422, RS 485 on any four points.
- b) Explain necessity of signal conditioning in mechatronics system. State different operations or process involved in signal conditioning.
- c) What is SCADA. Write note on different elements of SCADA
- d) Write a short note on Ladder programming in PLC.
- f) Explain H-bridge operation of motor driver for rotation of DC motor.

Q.5 Solve any two questions. **12**

- a) Write a note on LAN, MAN & WAN.
- b) Explain the seven layered OSI model.
- c) Explain Logical OR, AND & NAND functions in PLC programming.

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Power Plant and Energy Engineering (BTN02409)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

- Q.1 Choose the correct alternatives from the options.** **14**
- 1) _____ among the following is not a renewable source of energy. 01
 - a) Solar energy
 - b) Hydro-power
 - c) Kinetic energy
 - d) Geothermal energy
 - 2) Solar thermal power generation can be achieved by _____. 01
 - a) using focusing collector or heliostat
 - b) using solar ponds
 - c) using flat plate collectors
 - d) any of the above
 - 3) Highest point on the daily load curve, represents _____. 01
 - a) Peak demand
 - b) Peak supply
 - c) Peak rating
 - d) Peak power
 - 4) Energy from earth's crust is the _____. 01
 - a) Tidal energy
 - b) Wave energy
 - c) Geothermal energy
 - d) Solar energy
 - 5) In India largest thermal power station is located at _____. 01
 - a) Sarni
 - b) Singrauli
 - c) Kota
 - d) Neyveli
 - 6) Which one of the following is the maximum energy producing sector in India? 01
 - a) Nuclear
 - b) Hydro
 - c) Diesel
 - d) Thermal
 - 7) A load curve indicates _____. 01
 - a) average power used during the period
 - b) average kWh energy consumption during the period
 - c) Daily work load
 - d) neither (a) nor (b)

- 8) Diversity factor is always _____. 01
a) equal to unity b) less than unity
c) more than unity d) more than twenty
- 9) The height of wave determined _____. 01
a) By wind speed b) By a immersion scale
c) By force of wave d) By a floating device
- 10) Solar constant is _____. 01
a) 1327 W/m^2 b) 3271 W/m^2
c) 1732 W/m^2 d) 1307 W/m^2
- 11) The main objective of energy management is to _____. 01
a) Minimize energy cost
b) Maintain optimum energy procurement and utilization
c) Minimum environmental effects
d) All of these
- 12) Ocean thermal energy conversion (OTEC) is based on _____. 01
a) Wave energy
b) High tides
c) Temperature difference between the top layer of the ocean and the cooler water at its depth
d) High tides plus low tides
- 13) Read the following statements: 02
I) Diesel power plant is generally used as base load plant.
II) Gas turbine power plant is used as peak load plant.
a) Only I is correct b) I and II are correct
c) Only II is correct d) I and II are wrong

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Power Plant and Energy Engineering (BTN02409)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Solve any two questions from Section-I and Section-II.
 2) Figures to right indicate full marks.
 3) Make suitable assumptions, if required and state them clearly.

Section – I

- Q.2** a) Classify various sources of energy & explain in detail. **05**
 b) Explain role of NHPC & NTPC in power development of India. **05**
 c) Explain role of private sector in energy management. **04**

- Q.3** a) Elaborate with neat sketch different load curves along with their load factor. **05**
 b) The load supplied by a power station is given below. **05**

Time in Hr.	0 - 6	6 - 11	11 - 16	16 - 18	18 - 24
Load (MW)	30	100	70	110	80

Draw the chronological load curve & load duration curve. Determine plant capacity factor if plant capacity is 200 MW.

- c) How do you explain effect of variable load on power plant. **04**
- Q.4** a) Which parameters will be considered for site selection of thermal, hydro and nuclear power plant. **07**
 b) Compare thermal, hydroelectric and diesel power plant. **07**

Section – II

- Q.5** a) Explain with neat sketch liquid flat plate collector. **05**
 b) Explain with neat sketch any one solar radiation measurement instrument. **05**
 c) What is mean by energy audit & explain need of it. **04**

- Q.6** a) Explain with neat sketch solar pond. **05**
 b) What is HAWT. How it works explain with neat sketch. **05**
 c) How do you carryout energy conversion in organization? **04**

- Q.7** a) Why hybrid system is required? Explain wind solar hybrid system. **07**
 b) Explain with neat sketch OTEC with advantages and disadvantages. **07**

Seat No.	
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Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
 - 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume suitable data wherever needed and mention it clearly.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- | | | |
|----|--|----|
| 1) | Which one of the following is the maximum energy producing sector in India? | 01 |
| | a) Nuclear | |
| | b) Hydro | |
| | c) Diesel | |
| | d) Thermal | |
| 2) | A load curve indicates _____.
a) average power used during the period
b) average kWh energy consumption during the period
c) Daily work load
d) neither (a) nor (b) | 01 |
| 3) | Diversity factor is always _____.
a) equal to unity
b) less than unity
c) more than unity
d) more than twenty | 01 |
| 4) | The height of wave determined _____.
a) By wind speed
b) By a immersion scale
c) By force of wave
d) By a floating device | 01 |
| 5) | Solar constant is _____.
a) 1327 W/m ²
b) 3271 W/m ²
c) 1732 W/m ²
d) 1307 W/m ² | 01 |
| 6) | The main objective of energy management is to _____.
a) Minimize energy cost
b) Maintain optimum energy procurement and utilization
c) Minimum environmental effects
d) All of these | 01 |
| 7) | Ocean thermal energy conversion (OTEC) is based on _____.
a) Wave energy
b) High tides
c) Temperature difference between the top layer of the ocean and the cooler water at its depth
d) High tides plus low tides | 01 |

- 8) Read the following statements: 02
I) Diesel power plant is generally used as base load plant.
II) Gas turbine power plant is used as peak load plant.
a) Only I is correct b) I and II are correct
c) Only II is correct d) I and II are wrong
- 9) _____ among the following is not a renewable source of energy. 01
a) Solar energy b) Hydro-power
c) Kinetic energy d) Geothermal energy
- 10) Solar thermal power generation can be achieved by _____. 01
a) using focusing collector or heliostat
b) using solar ponds
c) using flat plate collectors
d) any of the above
- 11) Highest point on the daily load curve, represents _____. 01
a) Peak demand b) Peak supply
c) Peak rating d) Peak power
- 12) Energy from earth's crust is the _____. 01
a) Tidal energy b) Wave energy
c) Geothermal energy d) Solar energy
- 13) In India largest thermal power station is located at _____. 01
a) Sarni b) Singrauli
c) Kota d) Neyveli

Seat No.	
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Set

Q

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Power Plant and Energy Engineering (BTN02409)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Solve any two questions from Section-I and Section-II.
 2) Figures to right indicate full marks.
 3) Make suitable assumptions, if required and state them clearly.

Section – I

- Q.2** a) Classify various sources of energy & explain in detail. **05**
 b) Explain role of NHPC & NTPC in power development of India. **05**
 c) Explain role of private sector in energy management. **04**

- Q.3** a) Elaborate with neat sketch different load curves along with their load factor. **05**
 b) The load supplied by a power station is given below. **05**

Time in Hr.	0 - 6	6 - 11	11 - 16	16 - 18	18 - 24
Load (MW)	30	100	70	110	80

Draw the chronological load curve & load duration curve. Determine plant capacity factor if plant capacity is 200 MW.

- c) How do you explain effect of variable load on power plant. **04**
- Q.4** a) Which parameters will be considered for site selection of thermal, hydro and nuclear power plant. **07**
 b) Compare thermal, hydroelectric and diesel power plant. **07**

Section – II

- Q.5** a) Explain with neat sketch liquid flat plate collector. **05**
 b) Explain with neat sketch any one solar radiation measurement instrument. **05**
 c) What is mean by energy audit & explain need of it. **04**

- Q.6** a) Explain with neat sketch solar pond. **05**
 b) What is HAWT. How it works explain with neat sketch. **05**
 c) How do you carryout energy conversion in organization? **04**

- Q.7** a) Why hybrid system is required? Explain wind solar hybrid system. **07**
 b) Explain with neat sketch OTEC with advantages and disadvantages. **07**

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Power Plant and Energy Engineering (BTN02409)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

- Q.1 Choose the correct alternatives from the options.** **14**
- 1) Highest point on the daily load curve, represents _____. 01
 - a) Peak demand
 - b) Peak supply
 - c) Peak rating
 - d) Peak power
 - 2) Energy from earth's crust is the _____. 01
 - a) Tidal energy
 - b) Wave energy
 - c) Geothermal energy
 - d) Solar energy
 - 3) In India largest thermal power station is located at _____. 01
 - a) Sarni
 - b) Singrauli
 - c) Kota
 - d) Neyveli
 - 4) Which one of the following is the maximum energy producing sector in India? 01
 - a) Nuclear
 - b) Hydro
 - c) Diesel
 - d) Thermal
 - 5) A load curve indicates _____. 01
 - a) average power used during the period
 - b) average kWh energy consumption during the period
 - c) Daily work load
 - d) neither (a) nor (b)
 - 6) Diversity factor is always _____. 01
 - a) equal to unity
 - b) less than unity
 - c) more than unity
 - d) more than twenty
 - 7) The height of wave determined _____. 01
 - a) By wind speed
 - b) By a immersion scale
 - c) By force of wave
 - d) By a floating device
 - 8) Solar constant is _____. 01
 - a) 1327 W/m²
 - b) 3271 W/m²
 - c) 1732 W/m²
 - d) 1307 W/m²

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Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Power Plant and Energy Engineering (BTN02409)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Solve any two questions from Section-I and Section-II.
 2) Figures to right indicate full marks.
 3) Make suitable assumptions, if required and state them clearly.

Section – I

- Q.2** a) Classify various sources of energy & explain in detail. **05**
 b) Explain role of NHPC & NTPC in power development of India. **05**
 c) Explain role of private sector in energy management. **04**

- Q.3** a) Elaborate with neat sketch different load curves along with their load factor. **05**
 b) The load supplied by a power station is given below. **05**

Time in Hr.	0 - 6	6 - 11	11 - 16	16 - 18	18 - 24
Load (MW)	30	100	70	110	80

Draw the chronological load curve & load duration curve. Determine plant capacity factor if plant capacity is 200 MW.

- c) How do you explain effect of variable load on power plant. **04**
- Q.4** a) Which parameters will be considered for site selection of thermal, hydro and nuclear power plant. **07**
 b) Compare thermal, hydroelectric and diesel power plant. **07**

Section – II

- Q.5** a) Explain with neat sketch liquid flat plate collector. **05**
 b) Explain with neat sketch any one solar radiation measurement instrument. **05**
 c) What is mean by energy audit & explain need of it. **04**

- Q.6** a) Explain with neat sketch solar pond. **05**
 b) What is HAWT. How it works explain with neat sketch. **05**
 c) How do you carryout energy conversion in organization? **04**

- Q.7** a) Why hybrid system is required? Explain wind solar hybrid system. **07**
 b) Explain with neat sketch OTEC with advantages and disadvantages. **07**

Seat
No.Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Power Plant and Energy Engineering (BTN02409)

Day & Date: Thursday, 30-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- | | | |
|----|---|----|
| 1) | Diversity factor is always _____.
a) equal to unity
b) less than unity
c) more than unity
d) more than twenty | 01 |
| 2) | The height of wave determined _____.
a) By wind speed
b) By a immersion scale
c) By force of wave
d) By a floating device | 01 |
| 3) | Solar constant is _____.
a) 1327 W/m ²
b) 3271 W/m ²
c) 1732 W/m ²
d) 1307 W/m ² | 01 |
| 4) | The main objective of energy management is to _____.
a) Minimize energy cost
b) Maintain optimum energy procurement and utilization
c) Minimum environmental effects
d) All of these | 01 |
| 5) | Ocean thermal energy conversion (OTEC) is based on _____.
a) Wave energy
b) High tides
c) Temperature difference between the top layer of the ocean and the cooler water at its depth
d) High tides plus low tides | 01 |
| 6) | Read the following statements:
I) Diesel power plant is generally used as base load plant.
II) Gas turbine power plant is used as peak load plant.
a) Only I is correct
b) I and II are correct
c) Only II is correct
d) I and II are wrong | 02 |
| 7) | _____ among the following is not a renewable source of energy.
a) Solar energy
b) Hydro-power
c) Kinetic energy
d) Geothermal energy | 01 |

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Power Plant and Energy Engineering (BTN02409)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Solve any two questions from Section-I and Section-II.
 2) Figures to right indicate full marks.
 3) Make suitable assumptions, if required and state them clearly.

Section – I

- Q.2** a) Classify various sources of energy & explain in detail. **05**
 b) Explain role of NHPC & NTPC in power development of India. **05**
 c) Explain role of private sector in energy management. **04**

- Q.3** a) Elaborate with neat sketch different load curves along with their load factor. **05**
 b) The load supplied by a power station is given below. **05**

Time in Hr.	0 - 6	6 - 11	11 - 16	16 - 18	18 - 24
Load (MW)	30	100	70	110	80

Draw the chronological load curve & load duration curve. Determine plant capacity factor if plant capacity is 200 MW.

- c) How do you explain effect of variable load on power plant. **04**
- Q.4** a) Which parameters will be considered for site selection of thermal, hydro and nuclear power plant. **07**
 b) Compare thermal, hydroelectric and diesel power plant. **07**

Section – II

- Q.5** a) Explain with neat sketch liquid flat plate collector. **05**
 b) Explain with neat sketch any one solar radiation measurement instrument. **05**
 c) What is mean by energy audit & explain need of it. **04**

- Q.6** a) Explain with neat sketch solar pond. **05**
 b) What is HAWT. How it works explain with neat sketch. **05**
 c) How do you carryout energy conversion in organization? **04**

- Q.7** a) Why hybrid system is required? Explain wind solar hybrid system. **07**
 b) Explain with neat sketch OTEC with advantages and disadvantages. **07**

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Industrial Robotics (BTN02411)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary.
5) Use of non-programmable scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) What is the function of a frame grabber?
 - a) Sensing the object
 - b) Digitizing
 - c) Storing
 - d) None of these
- 2) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as
 - a) Forward kinematics
 - b) Inverse kinematics
 - c) Transformation
 - d) None of these
- 3) Which type of robot used for assembly purpose?
 - a) Jointed arm
 - b) PUMA
 - c) SCARA
 - d) None of these
- 4) Robot grippers for industrial robot typically employ _____ actuator.
 - a) Pneumatic
 - b) Hydraulic
 - c) Electric
 - d) Magnetic
- 5) The process of finding the position of the end effector when the joint variable are know is called _____.
 - a) Forward Kinematics
 - b) Inverse Kinematics
 - c) Forward Dynamics
 - d) Inverse Dynamics
- 6) The stability of robot systems is defined by method.
 - a) Liapunov's
 - b) Shapurov's
 - c) Makarov's
 - d) Azmanov's
- 7) Which of the following sensors is used in robot grippers?
 - a) Optical encoder
 - b) Tactile sensor
 - c) Force sensor
 - d) Flow sensor
- 8) Trajectory planning is done in _____.
 - a) Joint Space & Cartesian Space
 - b) Joint Space & Local Space
 - c) Joint Space & Global Space
 - d) Global Space & Cartesian Space

- 9) When the determinant of the manipulator Jacobian is zero, the configuration of the manipulator is said to be _____.
 - a) Angular
 - b) Rectangular
 - c) Singular
 - d) Spiral
- 10) A smart sensor can do which of the following _____.
 - a) Compensate for random errors
 - b) Automatic calibration of accuracy
 - c) Adjust for non linearities
 - d) All of the above
- 11) The order of the polynomial used for formulating the robot trajectory is usually a order polynomial
 - a) First
 - b) Second
 - c) Third
 - d) Fourth
- 12) A robot has to be designed for an arc welding operation. This requires that the robot must possess very high repeatability, typically less than 0.5 mm. Expected payload is less than 25 kg. Which drive system is the best suited for this application?
 - a) Magnetic
 - b) Hydraulic
 - c) Pneumatic
 - d) Electric
- 13) A gripper needs to be selected for an application involving assembly of a circular dowel pin a cylindrical blind hole of the base part. Which of the following grippers is the best suited for the task?
 - a) 2 finger parallel
 - b) Magnetic
 - c) Adhesive
 - d) Vacuum
- 14) A gripper used in assembly operations needs to be equipped with an arrangement which will allow a certain amount of flexibility in its wrist. This is to ensure assembly even if the axis of the part during insertion is slightly off-center. This type of compliance is compliance.
 - a) Active
 - b) Passive
 - c) Mutual
 - d) Progressive

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Industrial Robotics (BTN02411)

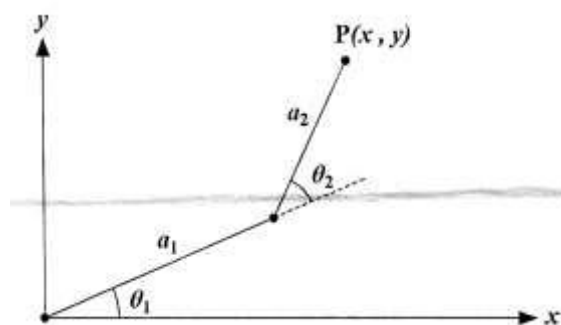
Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.

Section – I

- Q.2** a) Define “Industrial Robot”. List the reasons why and where industrial robots must be deployed in place of humans in the industrial workspace. State possible issues associated with the use of industrial robots in place of human operators. **08**
- b) Derive the forward transformation equations for a 2 DOF jointed arm. **06**
- Q.3** a) A vector $\bar{v} = 2\hat{i} + 5\hat{j} + 3\hat{k}$ is rotated by 60° about the z axis of the reference frame. It is then translated by 3, 4 and 5 units in x , y and z direction respectively. Find the vector with reference to the reference frame. **08**
- b) Discuss sensor classification for Industrial Robots. **06**
- Q.4** a) Derive the equation for the Jacobian of a 2 DOF jointed arm manipulator. In the figure given below the lengths of the links a_1 and a_2 of the manipulator are 200 mm each. Link angles θ_1 and θ_2 measure 20° and 30° respectively. If the tool velocity is 100 mm/s in both x and y directions calculate rotational speeds of link 1 and link 2 in degrees/sec. **08**



- b) Explain construction and working of stepper motor. List features and applications. **06**

Section – II

- | | | |
|------------|--|-----------|
| Q.5 | a) Explain with the help of block diagram the control of a DC servomotor used as actuator for robot joints. | 08 |
| | b) Explain with the help of neat sketch a typical control architecture for industrial robots. | 06 |
| | | |
| Q.6 | a) Explain the applications of robot in following:
i) Material handling
ii) Spray painting | 08 |
| | b) Compare wheeled robot and tracked robot in detail | 06 |
| | | |
| Q.7 | a) Discuss types of AGVs. List typical applications. | 06 |
| | b) Discuss the general classification of mobile robots. | 04 |
| | c) List four features of a robot used in arc welding application. | 04 |

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Industrial Robotics (BTN02411)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) Use of non-programmable scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Trajectory planning is done in _____.
 a) Joint Space & Cartesian Space
 b) Joint Space & Local Space
 c) Joint Space & Global Space
 d) Global Space & Cartesian Space
- 2) When the determinant of the manipulator Jacobian is zero, the configuration of the manipulator is said to be _____.
 a) Angular
 b) Rectangular
 c) Singular
 d) Spiral
- 3) A smart sensor can do which of the following _____.
 a) Compensate for random errors
 b) Automatic calibration of accuracy
 c) Adjust for non linearities
 d) All of the above
- 4) The order of the polynomial used for formulating the robot trajectory is usually a order polynomial
 a) First
 b) Second
 c) Third
 d) Fourth
- 5) A robot has to be designed for an arc welding operation. This requires that the robot must possess very high repeatability, typically less than 0.5 mm. Expected payload is less than 25 kg. Which drive system is the best suited for this application?
 a) Magnetic
 b) Hydraulic
 c) Pneumatic
 d) Electric
- 6) A gripper needs to be selected for an application involving assembly of a circular dowel pin a cylindrical blind hole of the base part. Which of the following grippers is the best suited for the task?
 a) 2 finger parallel
 b) Magnetic
 c) Adhesive
 d) Vacuum

- 7) A gripper used in assembly operations needs to be equipped with an arrangement which will allow a certain amount of flexibility in its wrist. This is to ensure assembly even if the axis of the part during insertion is slightly off-center. This type of compliance is compliance.
- a) Active
 - b) Passive
 - c) Mutual
 - d) Progressive
- 8) What is the function of a frame grabber?
- a) Sensing the object
 - b) Digitizing
 - c) Storing
 - d) None of these
- 9) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as
- a) Forward kinematics
 - b) Inverse kinematics
 - c) Transformation
 - d) None of these
- 10) Which type of robot used for assembly purpose?
- a) Jointed arm
 - b) PUMA
 - c) SCARA
 - d) None of these
- 11) Robot grippers for industrial robot typically employ _____ actuator.
- a) Pneumatic
 - b) Hydraulic
 - c) Electric
 - d) Magnetic
- 12) The process of finding the position of the end effector when the joint variable are know is called _____.
- a) Forward Kinematics
 - b) Inverse Kinematics
 - c) Forward Dynamics
 - d) Inverse Dynamics
- 13) The stability of robot systems is defined by method.
- a) Liapunov's
 - b) Shapurov's
 - c) Makarov's
 - d) Azmanov's
- 14) Which of the following sensors is used in robot grippers?
- a) Optical encoder
 - b) Tactile sensor
 - c) Force sensor
 - d) Flow sensor

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Industrial Robotics (BTN02411)

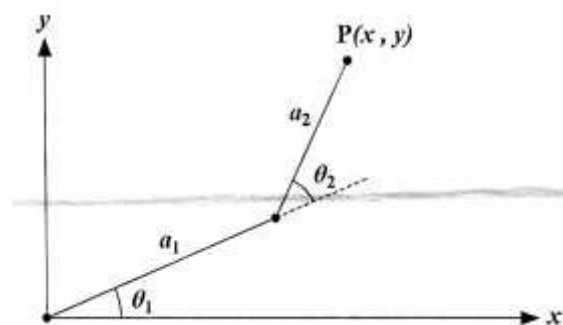
Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.

Section – I

- Q.2** a) Define “Industrial Robot”. List the reasons why and where industrial robots must be deployed in place of humans in the industrial workspace. State possible issues associated with the use of industrial robots in place of human operators. **08**
- b) Derive the forward transformation equations for a 2 DOF jointed arm. **06**
- Q.3** a) A vector $\vec{v} = 2\hat{i} + 5\hat{j} + 3\hat{k}$ is rotated by 60° about the z axis of the reference frame. It is then translated by 3, 4 and 5 units in x , y and z direction respectively. Find the vector with reference to the reference frame. **08**
- b) Discuss sensor classification for Industrial Robots. **06**
- Q.4** a) Derive the equation for the Jacobian of a 2 DOF jointed arm manipulator. In the figure given below the lengths of the links a_1 and a_2 of the manipulator are 200 mm each. Link angles θ_1 and θ_2 measure 20° and 30° respectively. If the tool velocity is 100 mm/s in both x and y directions calculate rotational speeds of link 1 and link 2 in degrees/sec. **08**



- b) Explain construction and working of stepper motor. List features and applications. **06**

Section – II

- | | | |
|------------|--|-----------|
| Q.5 | a) Explain with the help of block diagram the control of a DC servomotor used as actuator for robot joints. | 08 |
| | b) Explain with the help of neat sketch a typical control architecture for industrial robots. | 06 |
| | | |
| Q.6 | a) Explain the applications of robot in following:
i) Material handling
ii) Spray painting | 08 |
| | b) Compare wheeled robot and tracked robot in detail | 06 |
| | | |
| Q.7 | a) Discuss types of AGVs. List typical applications. | 06 |
| | b) Discuss the general classification of mobile robots. | 04 |
| | c) List four features of a robot used in arc welding application. | 04 |

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Industrial Robotics (BTN02411)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) Use of non-programmable scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) The order of the polynomial used for formulating the robot trajectory is usually a order polynomial

a) First	b) Second
c) Third	d) Fourth
- 2) A robot has to be designed for an arc welding operation. This requires that the robot must possess very high repeatability, typically less than 0.5 mm. Expected payload is less than 25 kg. Which drive system is the best suited for this application?

a) Magnetic	b) Hydraulic
c) Pneumatic	d) Electric
- 3) A gripper needs to be selected for an application involving assembly of a circular dowel pin a cylindrical blind hole of the base part. Which of the following grippers is the best suited for the task?

a) 2 finger parallel	b) Magnetic
c) Adhesive	d) Vacuum
- 4) A gripper used in assembly operations needs to be equipped with an arrangement which will allow a certain amount of flexibility in its wrist. This is to ensure assembly even if the axis of the part during insertion is slightly off-center. This type of compliance is compliance.

a) Active	b) Passive
c) Mutual	d) Progressive
- 5) What is the function of a frame grabber?

a) Sensing the object	b) Digitizing
c) Storing	d) None of these
- 6) When the joint angles and the different configurations of manipulator are derived from the position orientation, the scheme is known as

a) Forward kinematics	b) Inverse kinematics
c) Transformation	d) None of these

- 7) Which type of robot used for assembly purpose?
 - a) Jointed arm
 - b) PUMA
 - c) SCARA
 - d) None of these
- 8) Robot grippers for industrial robot typically employ _____ actuator.
 - a) Pneumatic
 - b) Hydraulic
 - c) Electric
 - d) Magnetic
- 9) The process of finding the position of the end effector when the joint variable are know is called _____.
 - a) Forward Kinematics
 - b) Inverse Kinematics
 - c) Forward Dynamics
 - d) Inverse Dynamics
- 10) The stability of robot systems is defined by method.
 - a) Liapunov's
 - b) Shapurov's
 - c) Makarov's
 - d) Azmanov's
- 11) Which of the following sensors is used in robot grippers?
 - a) Optical encoder
 - b) Tactile sensor
 - c) Force sensor
 - d) Flow sensor
- 12) Trajectory planning is done in _____.
 - a) Joint Space & Cartesian Space
 - b) Joint Space & Local Space
 - c) Joint Space & Global Space
 - d) Global Space & Cartesian Space
- 13) When the determinant of the manipulator Jacobian is zero, the configuration of the manipulator is said to be _____.
 - a) Angular
 - b) Rectangular
 - c) Singular
 - d) Spiral
- 14) A smart sensor can do which of the following _____.
 - a) Compensate for random errors
 - b) Automatic calibration of accuracy
 - c) Adjust for non linearities
 - d) All of the above

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Industrial Robotics (BTN02411)

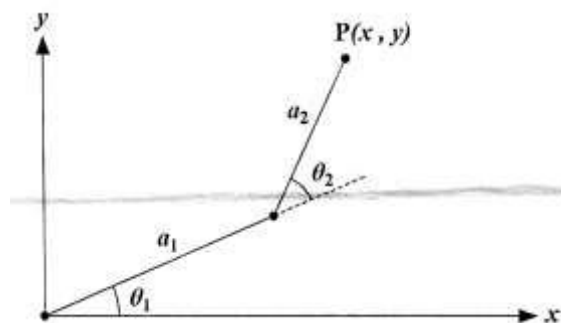
Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.

Section – I

- Q.2** a) Define “Industrial Robot”. List the reasons why and where industrial robots must be deployed in place of humans in the industrial workspace. State possible issues associated with the use of industrial robots in place of human operators. **08**
- b) Derive the forward transformation equations for a 2 DOF jointed arm. **06**
- Q.3** a) A vector $\bar{v} = 2\hat{i} + 5\hat{j} + 3\hat{k}$ is rotated by 60° about the z axis of the reference frame. It is then translated by 3, 4 and 5 units in x , y and z direction respectively. Find the vector with reference to the reference frame. **08**
- b) Discuss sensor classification for Industrial Robots. **06**
- Q.4** a) Derive the equation for the Jacobian of a 2 DOF jointed arm manipulator. In the figure given below the lengths of the links a_1 and a_2 of the manipulator are 200 mm each. Link angles θ_1 and θ_2 measure 20° and 30° respectively. If the tool velocity is 100 mm/s in both x and y directions calculate rotational speeds of link 1 and link 2 in degrees/sec. **08**



- b) Explain construction and working of stepper motor. List features and applications. **06**

Section – II

- | | | |
|------------|--|-----------|
| Q.5 | a) Explain with the help of block diagram the control of a DC servomotor used as actuator for robot joints. | 08 |
| | b) Explain with the help of neat sketch a typical control architecture for industrial robots. | 06 |
| | | |
| Q.6 | a) Explain the applications of robot in following:
i) Material handling
ii) Spray painting | 08 |
| | b) Compare wheeled robot and tracked robot in detail | 06 |
| | | |
| Q.7 | a) Discuss types of AGVs. List typical applications. | 06 |
| | b) Discuss the general classification of mobile robots. | 04 |
| | c) List four features of a robot used in arc welding application. | 04 |

Seat No.	
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- Page 14 of 16

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Industrial Robotics (BTN02411)

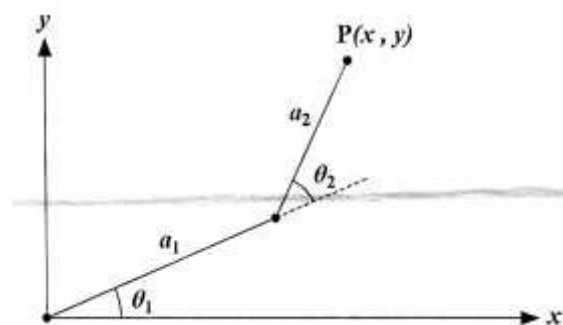
Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from each section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.

Section – I

- Q.2** a) Define “Industrial Robot”. List the reasons why and where industrial robots must be deployed in place of humans in the industrial workspace. State possible issues associated with the use of industrial robots in place of human operators. **08**
- b) Derive the forward transformation equations for a 2 DOF jointed arm. **06**
- Q.3** a) A vector $\bar{v} = 2\hat{i} + 5\hat{j} + 3\hat{k}$ is rotated by 60° about the z axis of the reference frame. It is then translated by 3, 4 and 5 units in x , y and z direction respectively. Find the vector with reference to the reference frame. **08**
- b) Discuss sensor classification for Industrial Robots. **06**
- Q.4** a) Derive the equation for the Jacobian of a 2 DOF jointed arm manipulator. In the figure given below the lengths of the links a_1 and a_2 of the manipulator are 200 mm each. Link angles θ_1 and θ_2 measure 20° and 30° respectively. If the tool velocity is 100 mm/s in both x and y directions calculate rotational speeds of link 1 and link 2 in degrees/sec. **08**



- b) Explain construction and working of stepper motor. List features and applications. **06**

Section – II

- | | | |
|------------|--|-----------|
| Q.5 | a) Explain with the help of block diagram the control of a DC servomotor used as actuator for robot joints. | 08 |
| | b) Explain with the help of neat sketch a typical control architecture for industrial robots. | 06 |
| | | |
| Q.6 | a) Explain the applications of robot in following:
i) Material handling
ii) Spray painting | 08 |
| | b) Compare wheeled robot and tracked robot in detail | 06 |
| | | |
| Q.7 | a) Discuss types of AGVs. List typical applications. | 06 |
| | b) Discuss the general classification of mobile robots. | 04 |
| | c) List four features of a robot used in arc welding application. | 04 |

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary.
5) Use of Scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative from the given option.

14

- 1) Which of the following RP system is not developed by 3D systems?
 - a) Selective Laser Sintering (SLS)
 - b) Multi-Jet Modelling System (MJM)
 - c) Paper Lamination Technology (PLT)
 - d) Stereolithography Apparatus (SLA)
- 2) Which of the following is used as base material in Stereolithography (SLA) process?
 - a) Thermoplastics, Metals powders
 - b) Thermoplastics, Eutectic metals.
 - c) Photopolymer
 - d) Titanium alloys
- 3) What is the third step in Reverse Engineering?
 - a) Digitization of the object
 - b) Creation of CAD model
 - c) Prototype
 - d) None of these
- 4) Which of the following advantage does not possess by the rapid prototyping process over the traditional prototyping process?
 - a) It consumes less time
 - b) Gives better quality
 - c) Reduces product launch time
 - d) It's cheaper
- 5) Which of the following is used as base material in Stereolithography (SLA) process?
 - a) Thermoplastics, Metals powders
 - b) Thermoplastics, Eutectic metals.
 - c) Photopolymer
 - d) Titanium alloys

- 6) Which kind of laser is used to cut the sheets in LOM?
 - a) Ruby Laser
 - b) Carbon Dioxide Laser
 - c) He-Ne Laser
 - d) None of these
- 7) STL file format is represented by interaction of _____.
 - a) lines and hexagons
 - b) lines and rectangles
 - c) lines and triangles
 - d) lines and circles
- 8) Which of the following is used as base material in Selective laser sintering (SLS)?
 - a) Photopolymer
 - b) Thermoplastics, Metal powders
 - c) Titanium alloys
 - d) Various materials
- 9) Which material gives finest surface finish in RP?
 - a) ABS
 - b) PLA
 - c) Nylon
 - d) INF
- 10) Which material is not used in 3D printing?
 - a) Nylon
 - b) ABS
 - c) PLA
 - d) PVC
- 11) Which of the following is not Liquid-based RP system?
 - a) Stereolithography Apparatus (SLA)
 - b) Laminated Object Manufacturing (LOM)
 - c) Solid Ground Curing (SGC)
 - d) Solid Object Ultraviolet-Laser Printer (SOUP)
- 12) Full form of STL is _____.
 - a) Straight-lithography
 - b) Streto-lithography
 - c) Stereo-lithography
 - d) Straight-lipsography
- 13) The STL files translate the part geometry from a CAD system to _____.
 - a) CNC machine
 - b) CMM machine
 - c) RP machine
 - d) CAPP machine
- 14) Which of the following addresses the need to design a product for safety?
 - a) Soft-Hard Review
 - b) Effect Analysis
 - c) Experimental design
 - d) None of these

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.
 5) Use of scientific calculator is allowed.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | Explain the need of additive manufacturing with respect to industry applications. | 10 |
| Q.3 | Describe the methodologies of Additive manufacturing. | 09 |
| Q.4 | Discuss Stereolithography Additive manufacturing machine with specification and applications. | 09 |
| Q.5 | What is meant by Computer Aided Design (CAD)? Explain importance of CAD in industries with applications? | 09 |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | Discuss the importance of parametric modeling in CAD software and how it can benefit the additive manufacturing process. | 10 |
| Q.7 | Illustrate feature-based modeling in CAD for 3D printing? | 09 |
| Q.8 | Enlist different polymer materials used in 3D printing and explain any 02 with applications. | 09 |
| Q.9 | Describe different applications of 3D printing in the field of Automobile, Medical and Aerospace sector. | 09 |

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) Use of Scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative from the given option.

14

- 1) Which of the following is used as base material in Selective laser sintering (SLS)?
 a) Photopolymer
 b) Thermoplastics, Metal powders
 c) Titanium alloys
 d) Various materials
- 2) Which material gives finest surface finish in RP?
 a) ABS
 b) PLA
 c) Nylon
 d) INF
- 3) Which material is not used in 3D printing?
 a) Nylon
 b) ABS
 c) PLA
 d) PVC
- 4) Which of the following is not Liquid-based RP system?
 a) Stereolithography Apparatus (SLA)
 b) Laminated Object Manufacturing (LOM)
 c) Solid Ground Curing (SGC)
 d) Solid Object Ultraviolet-Laser Printer (SOUP)
- 5) Full form of STL is _____.
 a) Straight-lithography
 b) Streto-lithography
 c) Stereo-lithography
 d) Straight-lipsography
- 6) The STL files translate the part geometry from a CAD system to _____.
 a) CNC machine
 b) CMM machine
 c) RP machine
 d) CAPP machine
- 7) Which of the following addresses the need to design a product for safety?
 a) Soft-Hard Review
 b) Effect Analysis
 c) Experimental design
 d) None of these

- 8) Which of the following RP system is not developed by 3D systems?
a) Selective Laser Sintering (SLS)
b) Multi-Jet Modelling System (MJM)
c) Paper Lamination Technology (PLT)
d) Stereolithography Apparatus (SLA)
- 9) Which of the following is used as base material in Stereolithography (SLA) process?
a) Thermoplastics, Metals powders
b) Thermoplastics, Eutectic metals.
c) Photopolymer
d) Titanium alloys
- 10) What is the third step in Reverse Engineering?
a) Digitization of the object b) Creation of CAD model
c) Prototype d) None of these
- 11) Which of the following advantage does not possess by the rapid prototyping process over the traditional prototyping process?
a) It consumes less time
b) Gives better quality
c) Reduces product launch time
d) It's cheaper
- 12) Which of the following is used as base material in Stereolithography (SLA) process?
a) Thermoplastics, Metals powders
b) Thermoplastics, Eutectic metals.
c) Photopolymer
d) Titanium alloys
- 13) Which kind of laser is used to cut the sheets in LOM?
a) Ruby Laser b) Carbon Dioxide Laser
c) He-Ne Laser d) None of these
- 14) STL file format is represented by interaction of _____.
a) lines and hexagons b) lines and rectangles
c) lines and triangles d) lines and circles

Seat No.	
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Set	Q
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.
 5) Use of scientific calculator is allowed.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | Explain the need of additive manufacturing with respect to industry applications. | 10 |
| Q.3 | Describe the methodologies of Additive manufacturing. | 09 |
| Q.4 | Discuss Stereolithography Additive manufacturing machine with specification and applications. | 09 |
| Q.5 | What is meant by Computer Aided Design (CAD)? Explain importance of CAD in industries with applications? | 09 |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | Discuss the importance of parametric modeling in CAD software and how it can benefit the additive manufacturing process. | 10 |
| Q.7 | Illustrate feature-based modeling in CAD for 3D printing? | 09 |
| Q.8 | Enlist different polymer materials used in 3D printing and explain any 02 with applications. | 09 |
| Q.9 | Describe different applications of 3D printing in the field of Automobile, Medical and Aerospace sector. | 09 |

Seat No.	
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Set R

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) Use of Scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative from the given option.

14

- 1) Which of the following is not Liquid-based RP system?
 - a) Stereolithography Apparatus (SLA)
 - b) Laminated Object Manufacturing (LOM)
 - c) Solid Ground Curing (SGC)
 - d) Solid Object Ultraviolet-Laser Printer (SOUP)
- 2) Full form of STL is _____.
 - a) Straight-lithography
 - b) Streto-lithography
 - c) Stereo-lithography
 - d) Straight-lipsography
- 3) The STL files translate the part geometry from a CAD system to _____.
 - a) CNC machine
 - b) CMM machine
 - c) RP machine
 - d) CAPP machine
- 4) Which of the following addresses the need to design a product for safety?
 - a) Soft-Hard Review
 - b) Effect Analysis
 - c) Experimental design
 - d) None of these
- 5) Which of the following RP system is not developed by 3D systems?
 - a) Selective Laser Sintering (SLS)
 - b) Multi-Jet Modelling System (MJM)
 - c) Paper Lamination Technology (PLT)
 - d) Stereolithography Apparatus (SLA)
- 6) Which of the following is used as base material in Stereolithography (SLA) process?
 - a) Thermoplastics, Metals powders
 - b) Thermoplastics, Eutectic metals.
 - c) Photopolymer
 - d) Titanium alloys
- 7) What is the third step in Reverse Engineering?
 - a) Digitization of the object
 - b) Creation of CAD model
 - c) Prototype
 - d) None of these

- 8) Which of the following advantage does not possess by the rapid prototyping process over the traditional prototyping process?
- a) It consumes less time
 - b) Gives better quality
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 - d) It's cheaper
- 9) Which of the following is used as base material in Stereolithography (SLA) process?
- a) Thermoplastics, Metals powders
 - b) Thermoplastics, Eutectic metals.
 - c) Photopolymer
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- 10) Which kind of laser is used to cut the sheets in LOM?
- a) Ruby Laser
 - b) Carbon Dioxide Laser
 - c) He-Ne Laser
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- 11) STL file format is represented by interaction of ____.
- a) lines and hexagons
 - b) lines and rectangles
 - c) lines and triangles
 - d) lines and circles
- 12) Which of the following is used as base material in Selective laser sintering (SLS)?
- a) Photopolymer
 - b) Thermoplastics, Metal powders
 - c) Titanium alloys
 - d) Various materials
- 13) Which material gives finest surface finish in RP?
- a) ABS
 - b) PLA
 - c) Nylon
 - d) INF
- 14) Which material is not used in 3D printing?
- a) Nylon
 - b) ABS
 - c) PLA
 - d) PVC

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
 2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
 3) Figures to the right indicate full marks.
 4) Assume suitable data wherever needed and mention it clearly.
 5) Use of scientific calculator is allowed.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | Explain the need of additive manufacturing with respect to industry applications. | 10 |
| Q.3 | Describe the methodologies of Additive manufacturing. | 09 |
| Q.4 | Discuss Stereolithography Additive manufacturing machine with specification and applications. | 09 |
| Q.5 | What is meant by Computer Aided Design (CAD)? Explain importance of CAD in industries with applications? | 09 |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | Discuss the importance of parametric modeling in CAD software and how it can benefit the additive manufacturing process. | 10 |
| Q.7 | Illustrate feature-based modeling in CAD for 3D printing? | 09 |
| Q.8 | Enlist different polymer materials used in 3D printing and explain any 02 with applications. | 09 |
| Q.9 | Describe different applications of 3D printing in the field of Automobile, Medical and Aerospace sector. | 09 |

Seat No.	
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Set	S
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) Use of Scientific calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative from the given option.

14

- 1) Which kind of laser is used to cut the sheets in LOM?
 - a) Ruby Laser
 - b) Carbon Dioxide Laser
 - c) He-Ne Laser
 - d) None of these
- 2) STL file format is represented by interaction of _____.
 - a) lines and hexagons
 - b) lines and rectangles
 - c) lines and triangles
 - d) lines and circles
- 3) Which of the following is used as base material in Selective laser sintering (SLS)?
 - a) Photopolymer
 - b) Thermoplastics, Metal powders
 - c) Titanium alloys
 - d) Various materials
- 4) Which material gives finest surface finish in RP?
 - a) ABS
 - b) PLA
 - c) Nylon
 - d) INF
- 5) Which material is not used in 3D printing?
 - a) Nylon
 - b) ABS
 - c) PLA
 - d) PVC
- 6) Which of the following is not Liquid-based RP system?
 - a) Stereolithography Apparatus (SLA)
 - b) Laminated Object Manufacturing (LOM)
 - c) Solid Ground Curing (SGC)
 - d) Solid Object Ultraviolet-Laser Printer (SOUP)
- 7) Full form of STL is _____.
 - a) Straight-lithography
 - b) Streto-lithography
 - c) Stereo-lithography
 - d) Straight-lipsography

- 8) The STL files translate the part geometry from a CAD system to _____.
 - a) CNC machine
 - b) CMM machine
 - c) RP machine
 - d) CAPP machine
- 9) Which of the following addresses the need to design a product for safety?
 - a) Soft-Hard Review
 - b) Effect Analysis
 - c) Experimental design
 - d) None of these
- 10) Which of the following RP system is not developed by 3D systems?
 - a) Selective Laser Sintering (SLS)
 - b) Multi-Jet Modelling System (MJM)
 - c) Paper Lamination Technology (PLT)
 - d) Stereolithography Apparatus (SLA)
- 11) Which of the following is used as base material in Stereolithography (SLA) process?
 - a) Thermoplastics, Metals powders
 - b) Thermoplastics, Eutectic metals.
 - c) Photopolymer
 - d) Titanium alloys
- 12) What is the third step in Reverse Engineering?
 - a) Digitization of the object
 - b) Creation of CAD model
 - c) Prototype
 - d) None of these
- 13) Which of the following advantage does not possess by the rapid prototyping process over the traditional prototyping process?
 - a) It consumes less time
 - b) Gives better quality
 - c) Reduces product launch time
 - d) It's cheaper
- 14) Which of the following is used as base material in Stereolithography (SLA) process?
 - a) Thermoplastics, Metals powders
 - b) Thermoplastics, Eutectic metals.
 - c) Photopolymer
 - d) Titanium alloys

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING
Introduction to 3D Printing (BTN02412)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Question no. 2 is compulsory in section I, and solve any two questions from the remaining. (Q. No. 3, 4 & 5)
2) Question no. 6 is compulsory in section II, and solve any two questions from the remaining. (Q. No. 7, 8 & 9)
3) Figures to the right indicate full marks.
4) Assume suitable data wherever needed and mention it clearly.
5) Use of scientific calculator is allowed.

Section – I

- | | | |
|------------|--|-----------|
| Q.2 | Explain the need of additive manufacturing with respect to industry applications. | 10 |
| Q.3 | Describe the methodologies of Additive manufacturing. | 09 |
| Q.4 | Discuss Stereolithography Additive manufacturing machine with specification and applications. | 09 |
| Q.5 | What is meant by Computer Aided Design (CAD)? Explain importance of CAD in industries with applications? | 09 |

Section – II

- | | | |
|------------|--|-----------|
| Q.6 | Discuss the importance of parametric modeling in CAD software and how it can benefit the additive manufacturing process. | 10 |
| Q.7 | Illustrate feature-based modeling in CAD for 3D printing? | 09 |
| Q.8 | Enlist different polymer materials used in 3D printing and explain any 02 with applications. | 09 |
| Q.9 | Describe different applications of 3D printing in the field of Automobile, Medical and Aerospace sector. | 09 |

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Renewable Energy Sources (BTN02413)

Max. Marks: 70

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary and mention it clearly.

Marks: 14

14

- Page 1 of 12

- 9) Solar collectors are coated with Black colour for the purpose of _____.
a) For minimum absorbtion of energy
b) For maximum absorbtion of energy
c) For maximum reflection of energy
d) None of above
- 10) Wind turbine converts _____ of wind into Mechanical energy.
a) Potential scale
b) Kinetic energy
c) Chemical energy
d) Thermal energy
- 11) What is a solar collector?
a) A system to collect heat by absorbing sunlight
b) A system to collect rainwater using sunlight
c) A system to collect electricity by using sunlight
d) A device to reflect sunlight back
- 12) How is the temperature maintained in a bubbling fluidized bed?
a) Biomass
b) Gasification agent
c) A constant ratio of biomass and gasification agent
d) Manipulating the ratio of biomass and gasification agent
- 13) Which of the following technologies are used to convert biomass into useful energy forms?
a) Bio-chemical process
b) Galvanization
c) Doping
d) Photoelectric effect
- 14) What is the major problem with wind energy?
a) Generates energy from wind
b) It is a renewable source of energy
c) Requires large area of land
d) Compact and does not require large area of land

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Renewable Energy Sources (BTN02413)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from both Section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.
 4) Use of scientific calculator is allowed.

Section – I

Q.2 Solve the following questions.

- | | |
|--|-----------|
| a) What are the advantages and disadvantages of conventional & non-conventional energy source? | 04 |
| b) What is the status of non-conventional energy sources in India, and what are their future prospect? | 05 |
| c) What are limitations of solar energy? | 05 |

Q.3 Solve the following questions.

- | | |
|--|-----------|
| a) What are the main advantages of flat plate solar collector? | 04 |
| b) What is the present status of nuclear energy and what are their future prospects? | 05 |
| c) What are major advantages and disadvantages of solar PV system? | 05 |

Q.4 Write a short note on

- | | |
|--|-----------|
| a) Importance of non-conventional energy sources | 04 |
| b) Solar dryers | 05 |
| c) Indirect forms of solar energy | 05 |

Section – II

Q.5 Solve the following questions

- | | |
|--|-----------|
| a) Explain the major application of wind power. | 04 |
| b) Explain the mechanism of production of local winds. | 05 |
| c) What are the most favorable sites for installing wind turbines? | 05 |

Q.6 Solve the following questions

- | | |
|--|-----------|
| a) What is the main advantage and disadvantage of biomass energy? | 05 |
| b) What is the effect of pumping on the output of tidal plant? | 04 |
| c) Explain the technology of Power generation through OTEC systems | 05 |

Q.7 Write a short note on:

- | | |
|---|-----------|
| a) Main advantages and disadvantages of OTEC system | 04 |
| b) Type of bio fuels | 05 |
| c) Advantages of tidal power plant. | 05 |

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024

MECHANICAL ENGINEERING

Renewable Energy Sources (BTN02413)

Day & Date: Saturday, 01-06-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Solar Energy can be directly converted into thermal energy by using _____.
 - a) Photovoltaic cell
 - b) Rechargeable cell
 - c) Solar Collector
 - d) Dry Cell
- 2) Solar collectors are coated with Black colour for the purpose of _____.
 - a) For minimum absorbtion of energy
 - b) For maximum absorbtion of energy
 - c) For maximum reflection of energy
 - d) None of above
- 3) Wind turbine converts _____ of wind into Mechanical energy.
 - a) Potential scale
 - b) Kinetic energy
 - c) Chemical energy
 - d) Thermal energy
- 4) What is a solar collector?
 - a) A system to collect heat by absorbing sunlight
 - b) A system to collect rainwater using sunlight
 - c) A system to collect electricity by using sunlight
 - d) A device to reflect sunlight back
- 5) How is the temperature maintained in a bubbling fluidized bed?
 - a) Biomass
 - b) Gasification agent
 - c) A constant ratio of biomass and gasification agent
 - d) Manipulating the ratio of biomass and gasification agent
- 6) Which of the following technologies are used to convert biomass into useful energy forms?
 - a) Bio-chemical process
 - b) Galvanization
 - c) Doping
 - d) Photoelectric effect

- 7) What is the major problem with wind energy?
a) Generates energy from wind
b) It is a renewable source of energy
c) Requires large area of land
d) Compact and does not require large area of land
- 8) Which of the following is not a renewable source of energy?
a) Wind
b) Tidal
c) Solar
d) Coal
- 9) Biomass is used in the production of _____.
a) fibres
b) chemicals
c) transportation fuels
d) biochemicals
- 10) Solar Power plant use _____ type of Collectors.
a) Concentrating
b) Flat plate
c) Evacuated tube
d) None of the above
- 11) The aerobic digestion of sewage is utilized in the production of _____.
a) metal articles
b) biofuels
c) biomass
d) synthetic fuels
- 12) Why is feathering of wind turbine blades required?
a) To increase drag
b) To reduce drag
c) To prevent the blades from being destroyed by strong winds
d) To extract power from strong winds originating from storms
- 13) Which of the following states is known oil reserves?
a) Jharkhand
b) Odisha
c) Madhya Pradesh
d) Assam
- 14) Industrial sector in India consumes _____ total commercial energy produced.
a) more than half of the
b) less than 10% of the
c) less than half of the
d) None of the Above

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Renewable Energy Sources (BTN02413)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from both Section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.
 4) Use of scientific calculator is allowed.

Section – I

Q.2 Solve the following questions.

- | | |
|--|-----------|
| a) What are the advantages and disadvantages of conventional & non-conventional energy source? | 04 |
| b) What is the status of non-conventional energy sources in India, and what are their future prospect? | 05 |
| c) What are limitations of solar energy? | 05 |

Q.3 Solve the following questions.

- | | |
|--|-----------|
| a) What are the main advantages of flat plate solar collector? | 04 |
| b) What is the present status of nuclear energy and what are their future prospects? | 05 |
| c) What are major advantages and disadvantages of solar PV system? | 05 |

Q.4 Write a short note on

- | | |
|--|-----------|
| a) Importance of non-conventional energy sources | 04 |
| b) Solar dryers | 05 |
| c) Indirect forms of solar energy | 05 |

Section – II

Q.5 Solve the following questions

- | | |
|--|-----------|
| a) Explain the major application of wind power. | 04 |
| b) Explain the mechanism of production of local winds. | 05 |
| c) What are the most favorable sites for installing wind turbines? | 05 |

Q.6 Solve the following questions

- | | |
|--|-----------|
| a) What is the main advantage and disadvantage of biomass energy? | 05 |
| b) What is the effect of pumping on the output of tidal plant? | 04 |
| c) Explain the technology of Power generation through OTEC systems | 05 |

Q.7 Write a short note on:

- | | |
|---|-----------|
| a) Main advantages and disadvantages of OTEC system | 04 |
| b) Type of bio fuels | 05 |
| c) Advantages of tidal power plant. | 05 |

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024**MECHANICAL ENGINEERING****Renewable Energy Sources (BTN02413)**

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) What is a solar collector?
 - a) A system to collect heat by absorbing sunlight
 - b) A system to collect rainwater using sunlight
 - c) A system to collect electricity by using sunlight
 - d) A device to reflect sunlight back
- 2) How is the temperature maintained in a bubbling fluidized bed?
 - a) Biomass
 - b) Gasification agent
 - c) A constant ratio of biomass and gasification agent
 - d) Manipulating the ratio of biomass and gasification agent
- 3) Which of the following technologies are used to convert biomass into useful energy forms?
 - a) Bio-chemical process
 - b) Galvanization
 - c) Doping
 - d) Photoelectric effect
- 4) What is the major problem with wind energy?
 - a) Generates energy from wind
 - b) It is a renewable source of energy
 - c) Requires large area of land
 - d) Compact and does not require large area of land
- 5) Which of the following is not a renewable source of energy?
 - a) Wind
 - b) Tidal
 - c) Solar
 - d) Coal
- 6) Biomass is used in the production of _____.
 - a) fibres
 - b) chemicals
 - c) transportation fuels
 - d) biochemicals
- 7) Solar Power plant use _____ type of Collectors.
 - a) Concentrating
 - b) Flat plate
 - c) Evacuated tube
 - d) None of the above

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024
MECHANICAL ENGINEERING
Renewable Energy Sources (BTN02413)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) Solve any two questions from both Section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.
 4) Use of scientific calculator is allowed.

Section – I

Q.2 Solve the following questions.

- | | |
|--|-----------|
| a) What are the advantages and disadvantages of conventional & non-conventional energy source? | 04 |
| b) What is the status of non-conventional energy sources in India, and what are their future prospect? | 05 |
| c) What are limitations of solar energy? | 05 |

Q.3 Solve the following questions.

- | | |
|--|-----------|
| a) What are the main advantages of flat plate solar collector? | 04 |
| b) What is the present status of nuclear energy and what are their future prospects? | 05 |
| c) What are major advantages and disadvantages of solar PV system? | 05 |

Q.4 Write a short note on

- | | |
|--|-----------|
| a) Importance of non-conventional energy sources | 04 |
| b) Solar dryers | 05 |
| c) Indirect forms of solar energy | 05 |

Section – II

Q.5 Solve the following questions

- | | |
|--|-----------|
| a) Explain the major application of wind power. | 04 |
| b) Explain the mechanism of production of local winds. | 05 |
| c) What are the most favorable sites for installing wind turbines? | 05 |

Q.6 Solve the following questions

- | | |
|--|-----------|
| a) What is the main advantage and disadvantage of biomass energy? | 05 |
| b) What is the effect of pumping on the output of tidal plant? | 04 |
| c) Explain the technology of Power generation through OTEC systems | 05 |

Q.7 Write a short note on:

- | | |
|---|-----------|
| a) Main advantages and disadvantages of OTEC system | 04 |
| b) Type of bio fuels | 05 |
| c) Advantages of tidal power plant. | 05 |

**Seat
No.**

MECHANICAL ENGINEERING

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Which of the following states is known oil reserves?

 - a) Jharkhand
 - b) Odisha
 - c) Madhya Pradesh
 - d) Assam
- 2) Industrial sector in India consumes _____ total commercial energy produced.

 - a) more than half of the
 - b) less than 10% of the
 - c) less than half of the
 - d) None of the Above
- 3) Solar Energy can be directly converted into thermal energy by using _____.

 - a) Photovoltaic cell
 - b) Rechargeable cell
 - c) Solar Collector
 - d) Dry Cell
- 4) Solar collectors are coated with Black colour for the purpose of _____.

 - a) For minimum absorbtion of energy
 - b) For maximum absorbtion of energy
 - c) For maximum reflection of energy
 - d) None of above
- 5) Wind turbine converts _____ of wind into Mechanical energy.

 - a) Potential scale
 - b) Kinetic energy
 - c) Chemical energy
 - d) Thermal energy
- 6) What is a solar collector?

 - a) A system to collect heat by absorbing sunlight
 - b) A system to collect rainwater using sunlight
 - c) A system to collect electricity by using sunlight
 - d) A device to reflect sunlight back
- 7) How is the temperature maintained in a bubbling fluidized bed?

 - a) Biomass
 - b) Gasification agent
 - c) A constant ratio of biomass and gasification agent
 - d) Manipulating the ratio of biomass and gasification agent

- 8) Which of the following technologies are used to convert biomass into useful energy forms?
- | | |
|-------------------------|-------------------------|
| a) Bio-chemical process | b) Galvanization |
| c) Doping | d) Photoelectric effect |
- 9) What is the major problem with wind energy?
- | |
|--|
| a) Generates energy from wind |
| b) It is a renewable source of energy |
| c) Requires large area of land |
| d) Compact and does not require large area of land |
- 10) Which of the following is not a renewable source of energy?
- | | |
|----------|----------|
| a) Wind | b) Tidal |
| c) Solar | d) Coal |
- 11) Biomass is used in the production of ____.
- | | |
|-------------------------|-----------------|
| a) fibres | b) chemicals |
| c) transportation fuels | d) biochemicals |
- 12) Solar Power plant use ____ type of Collectors.
- | | |
|-------------------|----------------------|
| a) Concentrating | b) Flat plate |
| c) Evacuated tube | d) None of the above |
- 13) The aerobic digestion of sewage is utilized in the production of ____.
- | | |
|-------------------|--------------------|
| a) metal articles | b) biofuels |
| c) biomass | d) synthetic fuels |
- 14) Why is feathering of wind turbine blades required?
- | |
|---|
| a) To increase drag |
| b) To reduce drag |
| c) To prevent the blades from being destroyed by strong winds |
| d) To extract power from strong winds originating from storms |

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024

MECHANICAL ENGINEERING

Renewable Energy Sources (BTN02413)

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Solve any two questions from both Section.
 2) Figures to the right indicate full marks.
 3) Assume suitable data wherever necessary and mention it clearly.
 4) Use of scientific calculator is allowed.

Section – I

Q.2 Solve the following questions.

- | | |
|--|-----------|
| a) What are the advantages and disadvantages of conventional & non-conventional energy source? | 04 |
| b) What is the status of non-conventional energy sources in India, and what are their future prospect? | 05 |
| c) What are limitations of solar energy? | 05 |

Q.3 Solve the following questions.

- | | |
|--|-----------|
| a) What are the main advantages of flat plate solar collector? | 04 |
| b) What is the present status of nuclear energy and what are their future prospects? | 05 |
| c) What are major advantages and disadvantages of solar PV system? | 05 |

Q.4 Write a short note on

- | | |
|--|-----------|
| a) Importance of non-conventional energy sources | 04 |
| b) Solar dryers | 05 |
| c) Indirect forms of solar energy | 05 |

Section – II

Q.5 Solve the following questions

- | | |
|--|-----------|
| a) Explain the major application of wind power. | 04 |
| b) Explain the mechanism of production of local winds. | 05 |
| c) What are the most favorable sites for installing wind turbines? | 05 |

Q.6 Solve the following questions

- | | |
|--|-----------|
| a) What is the main advantage and disadvantage of biomass energy? | 05 |
| b) What is the effect of pumping on the output of tidal plant? | 04 |
| c) Explain the technology of Power generation through OTEC systems | 05 |

Q.7 Write a short note on:

- | | |
|---|-----------|
| a) Main advantages and disadvantages of OTEC system | 04 |
| b) Type of bio fuels | 05 |
| c) Advantages of tidal power plant. | 05 |

Seat No.	
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Introduction to Automobile Engineering (BTN02414)

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks: 14

14

- 1) The cooling system of automobile engine is most simple when the engine is _____.
a) front
b) centre
c) rear on the left
d) rear on the right
- 2) Which of the following statements regarding four-wheel drive is correct?
a) All the four wheels can be steered
b) All the four wheels are powered
c) Vehicle has four wheels
d) None of the above
- 3) The front wheel drive as compared to rear wheel drive.
a) requires longer propeller shaft
b) gives better riding performance
c) has a greater skidding tendency
d) provides increased tractive effort
- 4) A clutch is usually designed to transmit maximum torque which is:
a) 90 percent of the maximum engine torque
b) equal to the maximum engine torque.
c) 150 percent of the maximum engine torque
d) none of the above
- 5) By using synchronizing device, the two involved adjacent gears have their speeds _____.
a) increased
b) reduced
c) equalized
d) unequalized
- 6) The smallest gears inside the differential casing are _____.
a) pinion gears
b) sun gears
c) side gears
d) ring gears
- 7) The brakes employed in cars are usually operated _____.
a) mechanically
b) hydraulically
c) by means of engine vacuum
d) by compressed air

Seat No.	
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Set P

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING**

Introduction to Automobile Engineering (BTN02414)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 Answer the following question

- | | |
|--|-----------|
| a) Explain front engine rear wheel drive with neat sketch. | 08 |
| b) Explain with neat sketch the centrifugal clutch. | 06 |

Q.3 Answer the following question

- | | |
|---|-----------|
| a) What are the requirements of the transmission system? Explain in brief with neat sketches. | 08 |
| b) What is differential? Explain its necessity. | 06 |

Q.4 Answer the following question

- | | |
|---|-----------|
| a) Explain air brake system layout with neat sketch. List its advantages. | 08 |
| b) What is drum brake? How it differs from the disc brake. | 06 |

Section – II

Q.5 Answer the following question

- | | |
|---|-----------|
| a) Explain with neat sketches worm and worm wheel steering gear box. | 08 |
| b) What is significance of steering ratio. Explain power steering with neat sketch. | 06 |

Q.6 Answer the following question

- | | |
|--|-----------|
| a) Draw neat sketches dependent and independent suspension systems. | 08 |
| b) What are the different types of wheels? Explain in brief each type. | 06 |

Q.7 Answer the following question

- | | |
|--|-----------|
| a) Explain with neat sketch automotive battery. | 06 |
| b) Write a short note on actuators and sensors used in automobile. | 04 |
| c) Write short note on spark plug. | 04 |

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Max. Marks: 70

Page 4 of 12

- 9) Which of the following statements regarding four-wheel drive is correct?
- a) All the four wheels can be steered
 - b) All the four wheels are powered
 - c) Vehicle has four wheels
 - d) None of the above
- 10) The front wheel drive as compared to rear wheel drive.
- a) requires longer' propeller shaft
 - b) gives better riding performance
 - c) has a greater skidding tendency
 - d) provides increased tractive effort
- 11) A clutch is usually designed to transmit maximum torque which is:
- a) 90 percent of the maximum engine torque
 - b) equal to the maximum engine torque.
 - c) 150 percent of the maximum engine torque
 - d) none of the above
- 12) By using synchronizing device, the two involved adjacent gears have their speeds ____.
- a) increased
 - b) reduced
 - c) equalized
 - d) unequalized
- 13) The smallest gears inside the differential casing are ____.
- a) pinion gears
 - b) sun gears
 - c) side gears
 - d) ring gears
- 14) The brakes employed in cars are usually operated ____.
- a) mechanically
 - b) hydraulically
 - c) by means of engine vacuum
 - d) by compressed air

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Introduction to Automobile Engineering (BTN02414)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 Answer the following question

- | | |
|--|-----------|
| a) Explain front engine rear wheel drive with neat sketch. | 08 |
| b) Explain with neat sketch the centrifugal clutch. | 06 |

Q.3 Answer the following question

- | | |
|---|-----------|
| a) What are the requirements of the transmission system? Explain in brief with neat sketches. | 08 |
| b) What is differential? Explain its necessity. | 06 |

Q.4 Answer the following question

- | | |
|---|-----------|
| a) Explain air brake system layout with neat sketch. List its advantages. | 08 |
| b) What is drum brake? How it differs from the disc brake. | 06 |

Section – II

Q.5 Answer the following question

- | | |
|---|-----------|
| a) Explain with neat sketches worm and worm wheel steering gear box. | 08 |
| b) What is significance of steering ratio. Explain power steering with neat sketch. | 06 |

Q.6 Answer the following question

- | | |
|--|-----------|
| a) Draw neat sketches dependent and independent suspension systems. | 08 |
| b) What are the different types of wheels? Explain in brief each type. | 06 |

Q.7 Answer the following question

- | | |
|--|-----------|
| a) Explain with neat sketch automotive battery. | 06 |
| b) Write a short note on actuators and sensors used in automobile. | 04 |
| c) Write short note on spark plug. | 04 |

Seat No.	
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Set	R
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Introduction to Automobile Engineering (BTN02414)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) The included angle is the sum of the _____.
 a) camber and caster b) caster and S.A.I.
 c) camber and S.A.I. d) camber and toe-in
- 2) The most effective section against the bending is _____.
 a) rectangular bar b) round bar
 c) round hollow tube d) square hollow section
- 3) _____ is the term used to describe any arrangement by which the wheels are connected to the carriage unit in a manner such that the rise and fall of one when has no effect on the others.
 a) Independent suspension b) Leaf spring suspension
 c) Conventional suspension d) none of the above
- 4) The components suspension system is:
 a) Springs
 b) Dampers or shock absorbers
 c) Stabilizer and a linkage system
 d) all of these
- 5) The cooling system of automobile engine is most simple when the engine is _____.
 a) front b) centre
 c) rear on the left d) rear on the right
- 6) Which of the following statements regarding four-wheel drive is correct?
 a) All the four wheels can be steered
 b) All the four wheels are powered
 c) Vehicle has four wheels
 d) None of the above
- 7) The front wheel drive as compared to rear wheel drive.
 a) requires longer' propeller shaft
 b) gives better riding performance
 c) has a greater skidding tendency
 d) provides increased tractive effort

- 8) A clutch is usually designed to transmit maximum torque which is:
a) 90 percent of the maximum engine torque
b) equal to the maximum engine torque.
c) 150 percent of the maximum engine torque
d) none of the above
- 9) By using synchronizing device, the two involved adjacent gears have their speeds _____.
a) increased
b) reduced
c) equalized
d) unequalized
- 10) The smallest gears inside the differential casing are _____.
a) pinion gears
b) sun gears
c) side gears
d) ring gears
- 11) The brakes employed in cars are usually operated _____.
a) mechanically
b) hydraulically
c) by means of engine vacuum
d) by compressed air
- 12) The hand brake usually operates on _____.
a) left wheels
b) front wheel
c) right wheel
d) rear wheels
- 13) Most popular manual steering gear for cars today is _____.
a) worm and nut type
b) worm and wheel type
c) cam and roller type
d) rack and pinion type
- 14) In the recirculating ball type steering gear, the balls travel between the ball nut and the _____.
a) gear rack
b) worm shaft
c) steering wheel shaft
d) worm wheel

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Introduction to Automobile Engineering (BTN02414)

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Answer the following question

- | | |
|--|-----------|
| a) Explain front engine rear wheel drive with neat sketch. | 08 |
| b) Explain with neat sketch the centrifugal clutch. | 06 |

Q.3 Answer the following question

- | | |
|---|-----------|
| a) What are the requirements of the transmission system? Explain in brief with neat sketches. | 08 |
| b) What is differential? Explain its necessity. | 06 |

Q.4 Answer the following question

- | | |
|---|-----------|
| a) Explain air brake system layout with neat sketch. List its advantages. | 08 |
| b) What is drum brake? How it differs from the disc brake. | 06 |

Section – II

Q.5 Answer the following question

- | | |
|---|-----------|
| a) Explain with neat sketches worm and worm wheel steering gear box. | 08 |
| b) What is significance of steering ratio. Explain power steering with neat sketch. | 06 |

Q.6 Answer the following question

- | | |
|--|-----------|
| a) Draw neat sketches dependent and independent suspension systems. | 08 |
| b) What are the different types of wheels? Explain in brief each type. | 06 |

Q.7 Answer the following question

- | | |
|--|-----------|
| a) Explain with neat sketch automotive battery. | 06 |
| b) Write a short note on actuators and sensors used in automobile. | 04 |
| c) Write short note on spark plug. | 04 |

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Max. Marks: 70

MCQ/Objective Type Questions

Marks: 14

14

- Page 10 of 12

- 9) The components suspension system is:
a) Springs
b) Dampers or shock absorbers
c) Stabilizer and a linkage system
d) all of these
- 10) The cooling system of automobile engine is most simple when the engine is _____.
a) front
b) centre
c) rear on the left
d) rear on the right
- 11) Which of the following statements regarding four-wheel drive is correct?
a) All the four wheels can be steered
b) All the four wheels are powered
c) Vehicle has four wheels
d) None of the above
- 12) The front wheel drive as compared to rear wheel drive.
a) requires longer' propeller shaft
b) gives better riding performance
c) has a greater skidding tendency
d) provides increased tractive effort
- 13) A clutch is usually designed to transmit maximum torque which is:
a) 90 percent of the maximum engine torque
b) equal to the maximum engine torque.
c) 150 percent of the maximum engine torque
d) none of the above
- 14) By using synchronizing device, the two involved adjacent gears have their speeds _____.
a) increased
b) reduced
c) equalized
d) unequalized

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
MECHANICAL ENGINEERING

Introduction to Automobile Engineering (BTN02414)

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) Solve any two questions from each section.
2) Figures to the right indicate full marks.

Section – I

Q.2 Answer the following question

- | | |
|--|-----------|
| a) Explain front engine rear wheel drive with neat sketch. | 08 |
| b) Explain with neat sketch the centrifugal clutch. | 06 |

Q.3 Answer the following question

- | | |
|---|-----------|
| a) What are the requirements of the transmission system? Explain in brief with neat sketches. | 08 |
| b) What is differential? Explain its necessity. | 06 |

Q.4 Answer the following question

- | | |
|---|-----------|
| a) Explain air brake system layout with neat sketch. List its advantages. | 08 |
| b) What is drum brake? How it differs from the disc brake. | 06 |

Section – II

Q.5 Answer the following question

- | | |
|---|-----------|
| a) Explain with neat sketches worm and worm wheel steering gear box. | 08 |
| b) What is significance of steering ratio. Explain power steering with neat sketch. | 06 |

Q.6 Answer the following question

- | | |
|--|-----------|
| a) Draw neat sketches dependent and independent suspension systems. | 08 |
| b) What are the different types of wheels? Explain in brief each type. | 06 |

Q.7 Answer the following question

- | | |
|--|-----------|
| a) Explain with neat sketch automotive battery. | 06 |
| b) Write a short note on actuators and sensors used in automobile. | 04 |
| c) Write short note on spark plug. | 04 |

Seat No.	
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Set P

S. Y. (B. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Engineering Mathematics – III (BTN04301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary.
 5) Use of non programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) An auxiliary equation of an ordinary differential equation gives the _____.
 a) Particular integral b) Particular Solution
 c) Complementary function d) Singular solution
- 2) $\frac{1}{D^2-4} \sin 3x =$ _____.
 a) $\frac{1}{5} \sin 3x$ b) $-\frac{1}{13} \cos 3x$
 c) $\frac{1}{13} \sin 3x$ d) $\frac{-1}{13} \sin 3x$
- 3) Particular Integral of $(D^2 - 3D + 2)y = 12$ is _____.
 a) 12 b) 6
 c) 1/6 d) 0
- 4) The conditions for expansion of a function in a Fourier series are known as
 a) Periodic b) Harmonic
 c) Dirichlet's conditions d) Riemann conditions
- 5) Fourier expansion of $f(x) = x + x^2$ in $(-1,1)$ has _____.
 a) cosine terms only b) sine terms only
 c) Both sine and cosine terms d) None of these
- 6) The region of convergence of interior of unit circle is represented by
 a) $|z| < 1$ b) $|z| > 1$
 c) $|z| = 1$ d) None of these
- 7) If $Z\{f(k)\} = F(z)$ then $Z\{a^k f(k)\} =$ _____.
 a) $F\left(\frac{a}{z}\right)$ b) $F\left(\frac{z}{a}\right)$
 c) $\frac{1}{a} F\left(\frac{a}{z}\right)$ d) None of these

- 8) Inverse Laplace Transform of $\frac{s}{s^2-9}$ is _____.
 a) $\sinh 3t$ b) $\cosh 3t$
 c) $\frac{1}{3}\sinh 3t$ d) $\frac{1}{3}\sin 3t$
- 9) If $L\{f(t)\} = F(s)$, then $L\left\{\int_0^t f(t)dt\right\}$ is _____.
 a) $\int_0^s F(s)ds$ b) $\int_0^s \frac{1}{s}F(s)ds$
 c) $sF(s)$ d) $\frac{1}{s}F(s)$
- 10) $L^{-1}\left\{\frac{1}{(s+3)^2}\right\} =$ _____.
 a) te^{-3t} b) te^{3t}
 c) $\frac{e^{3t}}{t}$ d) None of these
- 11) The total area under the standard normal curve is _____.
 a) 0.5 b) 1
 c) 2 d) 1.5
- 12) If two regression coefficients are 0.8 and 0.2, then the Correlation coefficient is _____.
 a) 0.16 b) 0.4
 c) 0.04 d) 0.016
- 13) In solving simultaneous equations by Gauss-Elimination method, the coefficient matrix is reduced to _____ matrix.
 a) Diagonal b) Lower triangular
 c) Upper triangular d) Singular
- 14) The Newton-Raphson method fails when _____.
 a) $f'(x)$ is zero b) $f'(x)$ is negative
 c) $f'(x)$ is too large d) Never fails

Seat No.	
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Set **P**

S. Y. (B. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING**Engineering Mathematics – III (BTN04301)**

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non programmable calculator is allowed.

Section – I**Q.2 Attempt any Three****09**

- Solve $(D^2 + 4D + 4)y = e^{3x} + \cos 5x$
- Solve $(D^2 + 2D + 3)y = x - x^2$
- Find the Fourier series for $f(x) = x^3$, in $(-\pi, \pi)$
- Find half rang sine series of $f(x) = e^{ax}$, in $(0, \pi)$
- Find Z-transform of $f(k) = \{k2^k + k3^k\}, k \geq 0$

Q.3 Attempt any Three**09**

- Solve $(D^2 - D + 1)y = \cos 2x$
- Solve $(D^3 + 1)y = 3 + e^{-x} + 5e^{2x}$
- Find the Fourier series of $f(x) = \frac{1}{2}(\pi - x)$, in $(0, 2\pi)$
- Find the inverse Z-transform of $F(z) = \frac{1}{z^2 - 3z + 2}, |z| > 2$
- Find Z-transform of $f(k) = 4^k, k < 0$
 $= 3^k, k \geq 0$

Q.4 Attempt any Two**10**

- The differential equation for charge Q of an electric circuit consisting an inductance L capacity C and an alternating e.m.f $E \sin nt$ is

$$L \frac{d^2 Q}{dt^2} + \frac{Q}{C} = E \sin nt$$
 If initially the current and charge on condenser are zero. prove that the current is given by

$$i = \frac{nE}{L(n^2 - \omega^2)} [\cos \omega t - \cos nt] \text{ where } \omega^2 = \frac{1}{CL}$$
- Find the Fourier series of $f(x) = x^2$ in $(-\pi, \pi)$
- Find Z-transform of $f(k) = \cos \alpha k, k \geq 0$

Section – II**Q.5 Attempt any Three****09**

- Find $L\{e^t(\sin 2t + t^2) + \cos^2 2t\}$
- Find $L^{-1}\left\{\frac{3s-7}{s^2-6s+8} + \frac{1}{(s-3)^3}\right\}$

- c) Given that
- | | |
|--------------------|------------------------|
| y (yield in kgs) | x (Rain fall in cms) |
| Mean 9.98 | 50.07 |
| SD 2.59 | 5.26 |
- And coefficient of correlation $r = 0.898$. Find the equation of line of regression of y on x .
- d) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- exactly 3
 - more than 2 will suffer a bad reaction
- e) Solve the following equation by Gauss Elimination method
 $x - y + z = 1$, $-3x + 2y - 3z = -6$, $2x - 5y + 4z = 5$

Q.6 Attempt any Three**09**

- a) Fit a Binomial Distribution to the following data.

x	0	1	2	3	4
f	30	62	46	10	2

- b) Find the real root of the equation $x^4 - x - 10 = 0$ by using Newton's-Raphson method correct to three decimal places (Take $x_0 = 2$)
- c) Find $L\{t(2 \sin 3t + e^{2t})\}$
- d) Find the root of equation $x^3 - 5x - 7 = 0$ which lies between 2 and 3 by the method of false position.
- e) Find the coefficient of correlation between x and y from the following data
 $n = 25$, $\Sigma x = 100$, $\Sigma x^2 = 950$, $\Sigma y = 110$, $\Sigma y^2 = 850$, $\Sigma xy = 800$

Q.7 Attempt any Two**10**

- a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^4+9)}\right\}$
- b) Solve the equations by Gauss-Seidal method (take three iterations)
 $10x + 2y + z = 9$, $2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$
- c) The sizes of hats is normally distributed with mean of 18.5 cms. and standard deviation of 2.5 cms. How many hats in total of 2000 will have sizes between
- 18 cms. and 20 cms.
 - above 20 cms. ?
- [Given: For S.N.V.z, area between $z = 0$ to $2 = 0.6$ is 0.2257 and between $z = 0$ to $z = 0.2$ is 0.0793]

- Page 6 of 16

Seat No.	
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Set **Q**

S. Y. (B. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Engineering Mathematics – III (BTN04301)

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non programmable calculator is allowed.

Section – I**Q.2 Attempt any Three****09**

- Solve $(D^2 + 4D + 4)y = e^{3x} + \cos 5x$
- Solve $(D^2 + 2D + 3)y = x - x^2$
- Find the Fourier series for $f(x) = x^3$, in $(-\pi, \pi)$
- Find half rang sine series of $f(x) = e^{ax}$, in $(0, \pi)$
- Find Z-transform of $f(k) = \{k2^k + k3^k\}, k \geq 0$

Q.3 Attempt any Three**09**

- Solve $(D^2 - D + 1)y = \cos 2x$
- Solve $(D^3 + 1)y = 3 + e^{-x} + 5e^{2x}$
- Find the Fourier series of $f(x) = \frac{1}{2}(\pi - x)$, in $(0, 2\pi)$
- Find the inverse Z-transform of $F(z) = \frac{1}{z^2 - 3z + 2}, |z| > 2$
- Find Z-transform of $f(k) = 4^k, k < 0$
 $= 3^k, k \geq 0$

Q.4 Attempt any Two**10**

- The differential equation for charge Q of an electric circuit consisting an inductance L capacity C and an alternating e.m.f $E \sin nt$ is

$$L \frac{d^2 Q}{dt^2} + \frac{Q}{C} = E \sin nt$$
 If initially the current and charge on condenser are zero. prove that the current is given by

$$i = \frac{nE}{L(n^2 - \omega^2)} [\cos \omega t - \cos nt] \text{ where } \omega^2 = \frac{1}{CL}$$
- Find the Fourier series of $f(x) = x^2$ in $(-\pi, \pi)$
- Find Z-transform of $f(k) = \cos \alpha k, k \geq 0$

Section – II**Q.5 Attempt any Three****09**

- Find $L\{e^t(\sin 2t + t^2) + \cos^2 2t\}$
- Find $L^{-1}\left\{\frac{3s-7}{s^2-6s+8} + \frac{1}{(s-3)^3}\right\}$

- c) Given that
- | | |
|--------------------|------------------------|
| y (yield in kgs) | x (Rain fall in cms) |
| Mean 9.98 | 50.07 |
| SD 2.59 | 5.26 |
- And coefficient of correlation $r = 0.898$. Find the equation of line of regression of y on x .
- d) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- exactly 3
 - more than 2 will suffer a bad reaction
- e) Solve the following equation by Gauss Elimination method
 $x - y + z = 1$, $-3x + 2y - 3z = -6$, $2x - 5y + 4z = 5$

Q.6 Attempt any Three**09**

- a) Fit a Binomial Distribution to the following data.

x	0	1	2	3	4
f	30	62	46	10	2

- b) Find the real root of the equation $x^4 - x - 10 = 0$ by using Newton's-Raphson method correct to three decimal places (Take $x_0 = 2$)
- c) Find $L\{t(2 \sin 3t + e^{2t})\}$
- d) Find the root of equation $x^3 - 5x - 7 = 0$ which lies between 2 and 3 by the method of false position.
- e) Find the coefficient of correlation between x and y from the following data
 $n = 25$, $\Sigma x = 100$, $\Sigma x^2 = 950$, $\Sigma y = 110$, $\Sigma y^2 = 850$, $\Sigma xy = 800$

Q.7 Attempt any Two**10**

- a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^4+9)}\right\}$
- b) Solve the equations by Gauss-Seidal method (take three iterations)
 $10x + 2y + z = 9$, $2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$
- c) The sizes of hats is normally distributed with mean of 18.5 cms. and standard deviation of 2.5 cms. How many hats in total of 2000 will have sizes between
- 18 cms. and 20 cms.
 - above 20 cms. ?
- [Given: For S.N.V.z, area between $z = 0$ to $2 = 0.6$ is 0.2257 and between $z = 0$ to $z = 0.2$ is 0.0793]

Seat No.	
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Day & Date: Monday, 13-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume data wherever necessary.
- 5) Use of non programmable calculator is allowed.

Marks:14

14

- Page 9 of 16

- 9) Fourier expansion of $f(x) = x + x^2$ in $(-1,1)$ has _____.
 a) cosine terms only b) sine terms only
 c) Both sine and cosine terms d) None of these
- 10) The region of convergence of interior of unit circle is represented by
 a) $|z| < 1$ b) $|z| > 1$
 c) $|z| = 1$ d) None of these
- 11) If $Z\{f(k)\} = F(z)$ then $Z\{a^k f(k)\} =$ _____.
 a) $F\left(\frac{a}{z}\right)$ b) $F\left(\frac{z}{a}\right)$
 c) $\frac{1}{a}F\left(\frac{a}{z}\right)$ d) None of these
- 12) Inverse Laplace Transform of $\frac{s}{s^2-9}$ is _____.
 a) $\sinh 3t$ b) $\cosh 3t$
 c) $\frac{1}{3}\sinh 3t$ d) $\frac{1}{3}\sin 3t$
- 13) If $L\{f(t)\} = F(s)$, then $L\left\{\int_0^t f(t)dt\right\}$ is _____.
 a) $\int_0^s F(s)ds$ b) $\int_0^s \frac{1}{s}F(s)ds$
 c) $sF(s)$ d) $\frac{1}{s}F(s)$
- 14) $L^{-1}\left\{\frac{1}{(s+3)^2}\right\} =$ _____.
 a) te^{-3t} b) te^{3t}
 c) $\frac{e^{3t}}{t}$ d) None of these

Seat No.	
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Set **R**

S. Y. (B. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING**Engineering Mathematics – III (BTN04301)**

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non programmable calculator is allowed.

Section – I**Q.2 Attempt any Three****09**

- Solve $(D^2 + 4D + 4)y = e^{3x} + \cos 5x$
- Solve $(D^2 + 2D + 3)y = x - x^2$
- Find the Fourier series for $f(x) = x^3$, in $(-\pi, \pi)$
- Find half rang sine series of $f(x) = e^{ax}$, in $(0, \pi)$
- Find Z-transform of $f(k) = \{k2^k + k3^k\}, k \geq 0$

Q.3 Attempt any Three**09**

- Solve $(D^2 - D + 1)y = \cos 2x$
- Solve $(D^3 + 1)y = 3 + e^{-x} + 5e^{2x}$
- Find the Fourier series of $f(x) = \frac{1}{2}(\pi - x)$, in $(0, 2\pi)$
- Find the inverse Z-transform of $F(z) = \frac{1}{z^2 - 3z + 2}, |z| > 2$
- Find Z-transform of $f(k) = 4^k, k < 0$
 $= 3^k, k \geq 0$

Q.4 Attempt any Two**10**

- The differential equation for charge Q of an electric circuit consisting an inductance L capacity C and an alternating e.m.f $E \sin nt$ is

$$L \frac{d^2 Q}{dt^2} + \frac{Q}{C} = E \sin nt$$
 If initially the current and charge on condenser are zero. prove that the current is given by

$$i = \frac{nE}{L(n^2 - \omega^2)} [\cos \omega t - \cos nt] \text{ where } \omega^2 = \frac{1}{CL}$$
- Find the Fourier series of $f(x) = x^2$ in $(-\pi, \pi)$
- Find Z-transform of $f(k) = \cos \alpha k, k \geq 0$

Section – II**Q.5 Attempt any Three****09**

- Find $L\{e^t(\sin 2t + t^2) + \cos^2 2t\}$
- Find $L^{-1}\left\{\frac{3s-7}{s^2-6s+8} + \frac{1}{(s-3)^3}\right\}$

- c) Given that
- | | |
|--------------------|------------------------|
| y (yield in kgs) | x (Rain fall in cms) |
| Mean 9.98 | 50.07 |
| SD 2.59 | 5.26 |
- And coefficient of correlation $r = 0.898$. Find the equation of line of regression of y on x .
- d) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- exactly 3
 - more than 2 will suffer a bad reaction
- e) Solve the following equation by Gauss Elimination method
 $x - y + z = 1$, $-3x + 2y - 3z = -6$, $2x - 5y + 4z = 5$

Q.6 Attempt any Three**09**

- a) Fit a Binomial Distribution to the following data.

x	0	1	2	3	4
f	30	62	46	10	2

- b) Find the real root of the equation $x^4 - x - 10 = 0$ by using Newton's-Raphson method correct to three decimal places (Take $x_0 = 2$)
- c) Find $L\{t(2 \sin 3t + e^{2t})\}$
- d) Find the root of equation $x^3 - 5x - 7 = 0$ which lies between 2 and 3 by the method of false position.
- e) Find the coefficient of correlation between x and y from the following data
 $n = 25$, $\Sigma x = 100$, $\Sigma x^2 = 950$, $\Sigma y = 110$, $\Sigma y^2 = 850$, $\Sigma xy = 800$

Q.7 Attempt any Two**10**

- a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^4+9)}\right\}$
- b) Solve the equations by Gauss-Seidal method (take three iterations)
 $10x + 2y + z = 9$, $2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$
- c) The sizes of hats is normally distributed with mean of 18.5 cms. and standard deviation of 2.5 cms. How many hats in total of 2000 will have sizes between
- 18 cms. and 20 cms.
 - above 20 cms. ?
- [Given: For S.N.V.z, area between $z = 0$ to $2 = 0.6$ is 0.2257 and between $z = 0$ to $z = 0.2$ is 0.0793]

Seat No.	
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Set **S**

S. Y. (B. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Engineering Mathematics – III (BTN04301)

Day & Date: Monday, 13-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary.
 5) Use of non programmable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The region of convergence of interior of unit circle is represented by
 - a) $|z| < 1$
 - b) $|z| > 1$
 - c) $|z| = 1$
 - d) None of these
- 2) If $Z\{f(k)\} = F(z)$ then $Z\{a^k f(k)\} = \underline{\hspace{2cm}}$.
 - a) $F\left(\frac{a}{z}\right)$
 - b) $F\left(\frac{z}{a}\right)$
 - c) $\frac{1}{a}F\left(\frac{a}{z}\right)$
 - d) None of these
- 3) Inverse Laplace Transform of $\frac{s}{s^2-9}$ is $\underline{\hspace{2cm}}$.
 - a) $\sinh 3t$
 - b) $\cosh 3t$
 - c) $\frac{1}{3}\sinh 3t$
 - d) $\frac{1}{3}\sin 3t$
- 4) If $L\{f(t)\} = F(s)$, then $L\left\{\int_0^t f(t)dt\right\}$ is $\underline{\hspace{2cm}}$.
 - a) $\int_0^s F(s)ds$
 - b) $\int_0^s \frac{1}{s}F(s)ds$
 - c) $sF(s)$
 - d) $\frac{1}{s}F(s)$
- 5) $L^{-1}\left\{\frac{1}{(s+3)^2}\right\} = \underline{\hspace{2cm}}$.
 - a) te^{-3t}
 - b) te^{3t}
 - c) $\frac{e^{3t}}{t}$
 - d) None of these
- 6) The total area under the standard normal curve is $\underline{\hspace{2cm}}$.
 - a) 0.5
 - b) 1
 - c) 2
 - d) 1.5

- Page 14 of 16

Seat No.	
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Set **S**

S. Y. (B. Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING**Engineering Mathematics – III (BTN04301)**

Day & Date: Monday, 13-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non programmable calculator is allowed.

Section – I**Q.2 Attempt any Three****09**

- Solve $(D^2 + 4D + 4)y = e^{3x} + \cos 5x$
- Solve $(D^2 + 2D + 3)y = x - x^2$
- Find the Fourier series for $f(x) = x^3$, in $(-\pi, \pi)$
- Find half rang sine series of $f(x) = e^{ax}$, in $(0, \pi)$
- Find Z-transform of $f(k) = \{k2^k + k3^k\}, k \geq 0$

Q.3 Attempt any Three**09**

- Solve $(D^2 - D + 1)y = \cos 2x$
- Solve $(D^3 + 1)y = 3 + e^{-x} + 5e^{2x}$
- Find the Fourier series of $f(x) = \frac{1}{2}(\pi - x)$, in $(0, 2\pi)$
- Find the inverse Z-transform of $F(z) = \frac{1}{z^2 - 3z + 2}, |z| > 2$
- Find Z-transform of $f(k) = 4^k, k < 0$
 $= 3^k, k \geq 0$

Q.4 Attempt any Two**10**

- The differential equation for charge Q of an electric circuit consisting an inductance L capacity C and an alternating e.m.f $E \sin nt$ is

$$L \frac{d^2 Q}{dt^2} + \frac{Q}{C} = E \sin nt$$
 If initially the current and charge on condenser are zero. prove that the current is given by

$$i = \frac{nE}{L(n^2 - \omega^2)} [\cos \omega t - \cos nt] \text{ where } \omega^2 = \frac{1}{CL}$$
- Find the Fourier series of $f(x) = x^2$ in $(-\pi, \pi)$
- Find Z-transform of $f(k) = \cos \alpha k, k \geq 0$

Section – II**Q.5 Attempt any Three****09**

- Find $L\{e^t(\sin 2t + t^2) + \cos^2 2t\}$
- Find $L^{-1}\left\{\frac{3s-7}{s^2-6s+8} + \frac{1}{(s-3)^3}\right\}$

- c) Given that
- | | |
|--------------------|------------------------|
| y (yield in kgs) | x (Rain fall in cms) |
| Mean 9.98 | 50.07 |
| SD 2.59 | 5.26 |
- And coefficient of correlation $r = 0.898$. Find the equation of line of regression of y on x .
- d) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, determine the probability that out of 2000 individuals
- exactly 3
 - more than 2 will suffer a bad reaction
- e) Solve the following equation by Gauss Elimination method
 $x - y + z = 1$, $-3x + 2y - 3z = -6$, $2x - 5y + 4z = 5$

Q.6 Attempt any Three**09**

- a) Fit a Binomial Distribution to the following data.

x	0	1	2	3	4
f	30	62	46	10	2

- b) Find the real root of the equation $x^4 - x - 10 = 0$ by using Newton's-Raphson method correct to three decimal places (Take $x_0 = 2$)
- c) Find $L\{t(2 \sin 3t + e^{2t})\}$
- d) Find the root of equation $x^3 - 5x - 7 = 0$ which lies between 2 and 3 by the method of false position.
- e) Find the coefficient of correlation between x and y from the following data
 $n = 25$, $\Sigma x = 100$, $\Sigma x^2 = 950$, $\Sigma y = 110$, $\Sigma y^2 = 850$, $\Sigma xy = 800$

Q.7 Attempt any Two**10**

- a) Find $L^{-1}\left\{\frac{s+29}{(s+4)(s^4+9)}\right\}$
- b) Solve the equations by Gauss-Seidal method (take three iterations)
 $10x + 2y + z = 9$, $2x + 20y - 2z = -44$, $-2x + 3y + 10z = 22$
- c) The sizes of hats is normally distributed with mean of 18.5 cms. and standard deviation of 2.5 cms. How many hats in total of 2000 will have sizes between
- 18 cms. and 20 cms.
 - above 20 cms. ?
- [Given: For S.N.V.z, area between $z = 0$ to $2 = 0.6$ is 0.2257 and between $z = 0$ to $z = 0.2$ is 0.0793]

**Seat
No.**

Set	P
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99	1
100	1

Network Theory and Analysis (BTN04303)

Time: 03:00 PM To 06:00 PM

4) Assume suitable data wherever needed and mention it clearly.

Marks: 14

14

- 1) The time constant of a series RC circuit is _____.
a) RC b) $\frac{R}{C}$
c) $\frac{C}{R}$ d) $\frac{1}{RC}$
- 2) Quality factor of series circuit RLC circuit is _____.
a) $\frac{\omega R}{L}$ b) $\frac{\omega L}{R}$
c) $\frac{\omega C}{R}$ d) $\frac{\omega R}{C}$
- 3) Maximum power is transferred when the load impedance is equal to _____.
a) Source impedance b) Zero
c) Half of Source Impedance d) none
- 4) The h parameters h_{12} and h_{22} are obtained by _____.
a) by shorting input terminals b) by shorting output terminals
c) by opening input terminals d) by opening output terminals
- 5) A capacitor $40 \mu F$ and $8 mH$ coil are in series across an ac source. The resonant frequency is _____.
a) $28.1 Hz$ b) $281 Hz$
c) $2810 Hz$ d) $28.1 KHz$
- 6) Norton's equivalent circuit consists of _____.
a) Voltage Source in parallel with resistance
b) Voltage Source in series with resistance
c) Current Source in parallel with resistance
d) Current Source in series with resistance
- 7) Which of the following circuits appears as a very high resistance at resonance?
a) series & parallel resonant b) series resonant
c) parallel resonant d) none of the above

- 8) The driving admittance ($Y_{11}(s)$) is defined as _____.
a) The ratio of transform voltage to transform current at the same port
b) The ratio of transform voltage at one port to transform current at the other port
c) The ratio of transform current at one port to transform voltage at the same port
d) The ratio of transform voltage at one port to transform voltage at the other port
- 9) The transient current in loss free LC circuit when excited from AC source is an _____ Sine wave.
a) un damped
b) over damped
c) under damped
d) critically damped
- 10) If a high pass filter having $L = 47.74\text{mH}$ and $C = 0.133\text{ }\mu\text{F}$ then design impedance K will be _____.
a) 400 ohm
b) 500 ohm
c) 600 ohm
d) 650 ohm
- 11) A band elimination filter is the one _____.
a) which attenuates all the frequencies less than lower cut off frequency
b) which attenuates all the frequencies greater than upper cut off frequency
c) frequencies lying between f_1 and f_2 are attenuated and all other frequencies are passed
d) frequencies lying between f_1 and f_2 are passed and all other are attenuated
- 12) In the m-derived high pass filters the resonant frequency is to be chosen so that it is _____.
a) Above the cut-off frequency
b) Below the cut-off frequency
c) Equal to the cut-off frequency
d) None of the above
- 13) When two port networks are connected in series, the parameters of the interconnected network can be conveniently expressed with help of _____.
a) Z parameter
b) h parameter
c) Y parameter
d) Transmission parameter
- 14) The system is said to be unstable if _____.
a) all the poles lie on right half of s plane
b) all the poles lie on left half of s plane
c) all poles do not lie on right half of s plane
d) both a and b

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Network Theory and Analysis (BTN04303)

Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

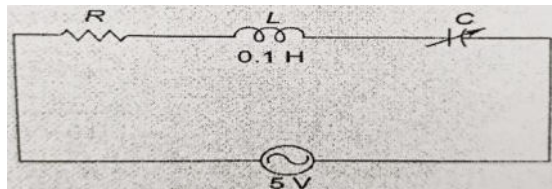
- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary and mention it clearly before the Solution.

Section – I

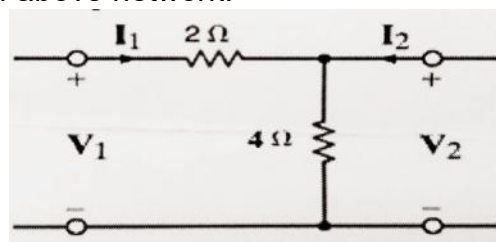
Q.2 Attempt any Four:

16

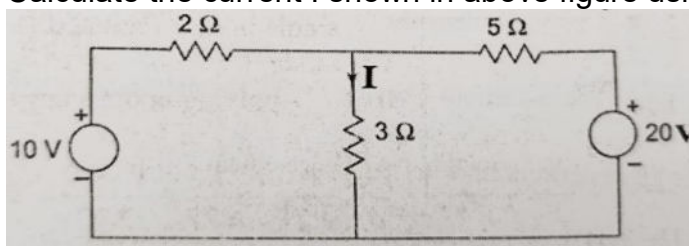
- Write a performance equation of a two-port network in terms of admittance parameters. How can these parameters be determined?
- In a series RLC circuit a maximum current of 0.1 A flows through circuit when the capacitor is $5\mu\text{f}$, inductor is 0.1H with a fixed frequency at voltage of 5V. Determine the frequency at which the circuit resonates, the bandwidth, the quality factor Q and the value of resistance at resonant frequency.
- In the circuit shown above a maximum current of 0.1A flows through the circuit when capacitor is at $5\mu\text{F}$ with fixed frequency and voltage of 5V. Determine frequency at which the circuit resonates, bandwidth, quality factor and resistance R.



- Find h parameter of above network.

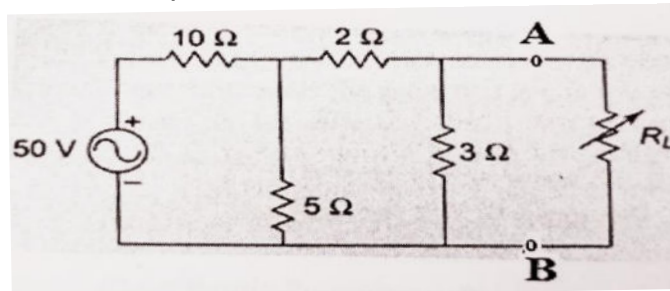


- Calculate the current I shown in above figure using millman's theorem.



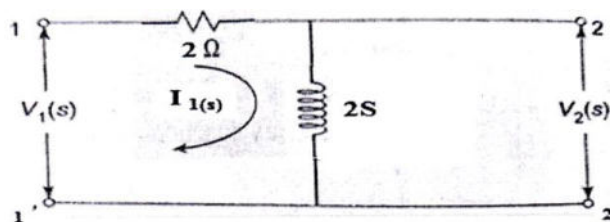
Q.3 Attempt any Two:

- Derive ABCD parameters in terms of Z and Y parameters.
- Derive an expression of resonant frequency for a parallel resonance circuit.
- Determine the maximum power delivered to load in the circuit shown above.

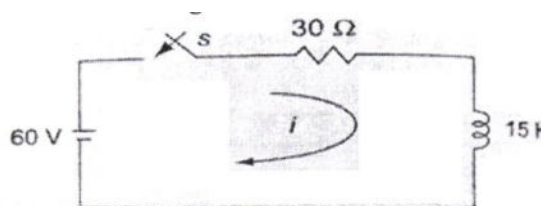
**Section – II****Q.4 Attempt any Four:**

16

- Design a π type attenuator to give 30dB attenuation & to have characteristics impedance of 200Ω .
- Derive an expression of cutoff frequency for constant K high pass filter.
- For above network obtain transfer function $G_{21}(s)$, $Z_{21}(s)$ & $Z_{11}(s)$



- Check stability of following polynomial by applying Routh criteria
 $Q(S) = S^3 + 2S^2 + 8S + 10$
- A series RL circuit with $R = 30\Omega$ & $L = 15H$ has constant voltage of $V = 60V$ applied at $t=0$ as shown in above figure. Find Current I and Voltage across R and L

**Q.5 Attempt any Two:**

12

- Design a constant K low pass filter (T & π section) having $f_c = 5KHz$ and design impedance $R_o = 800\Omega$
- Derive an expression of current, V_R & V_C for dc response of series RC circuit.
- Draw the pole-zero plot for the given network function and hence obtain $V(t)$.

Seat No.	
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Set	Q
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Network Theory and Analysis (BTN04303)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 - 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) The driving admittance (Y_{11} (s)) is defined as _____.
 - a) The ratio of transform voltage to transform current at the same port
 - b) The ratio of transform voltage at one port to transform current at the other port
 - c) The ratio of transform current at one port to transform voltage at the same port
 - d) The ratio of transform voltage at one port to transform voltage at the other port
- 2) The transient current in loss free LC circuit when excited from AC source is an _____ Sine wave.

a) un damped	b) over damped
c) under damped	d) critically damped
- 3) If a high pass filter having $L = 47.74\text{mH}$ and $C = 0.133\text{ }\mu\text{F}$ then design impedance K will be _____.

a) 400 ohm	b) 500 ohm
c) 600 ohm	d) 650 ohm
- 4) A band elimination filter is the one _____.
 - a) which attenuates all the frequencies less than lower cut off frequency
 - b) which attenuates all the frequencies greater than upper cut off frequency
 - c) frequencies lying between f_1 and f_2 are attenuated and all other frequencies are passed
 - d) frequencies lying between f_1 and f_2 are passed and all other are attenuated
- 5) In the m-derived high pass filters the resonant frequency is to be chosen so that it is _____.

a) Above the cut-off frequency	b) Below the cut-off frequency
c) Equal to the cut-off frequency	d) None of the above

Seat No.	
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Set	Q
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Network Theory and Analysis (BTN04303)

Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

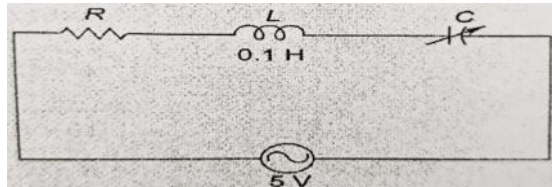
- Instructions:** 1) All questions are compulsory.
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Section – I

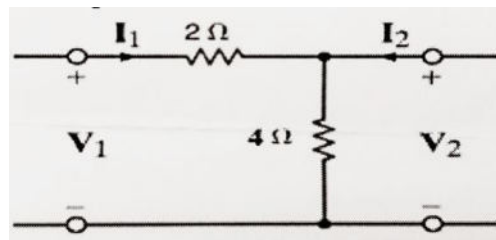
Q.2 Attempt any Four:

16

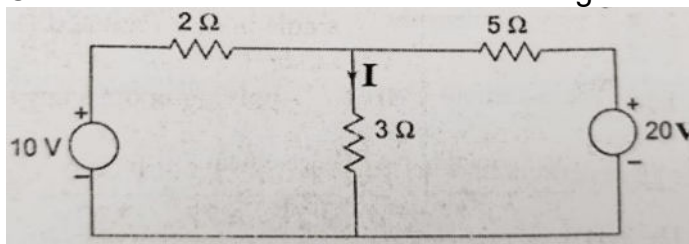
- Write a performance equation of a two-port network in terms of admittance parameters. How can these parameters be determined?
- In a series RLC circuit a maximum current of 0.1 A flows through circuit when the capacitor is $5\mu\text{F}$, inductor is 0.1H with a fixed frequency at voltage of 5V. Determine the frequency at which the circuit resonates, the bandwidth, the quality factor Q and the value of resistance at resonant frequency.
- In the circuit shown above a maximum current of 0.1A flows through the circuit when capacitor is at $5\mu\text{F}$ with fixed frequency and voltage of 5V. Determine frequency at which the circuit resonates, bandwidth, quality factor and resistance R.



- Find h parameter of above network.

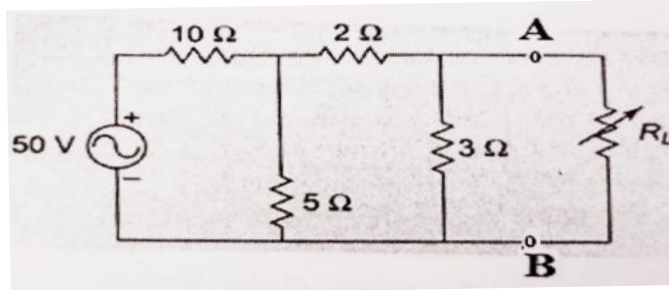


- Calculate the current I shown in above figure using millman's theorem.



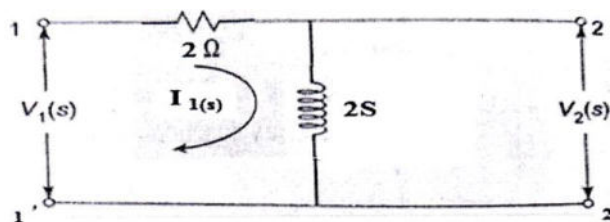
Q.3 Attempt any Two:

- Derive ABCD parameters in terms of Z and Y parameters.
- Derive an expression of resonant frequency for a parallel resonance circuit.
- Determine the maximum power delivered to load in the circuit shown above.

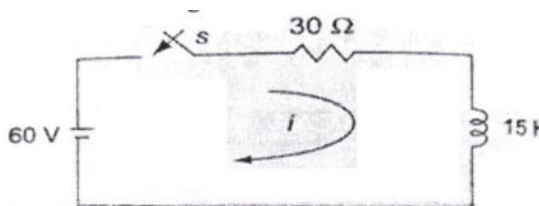
**Section – II****Q.4 Attempt any Four:**

16

- Design a π type attenuator to give 30dB attenuation & to have characteristics impedance of 200Ω .
- Derive an expression of cutoff frequency for constant K high pass filter.
- For above network obtain transfer function $G_{21}(s)$, $Z_{21}(s)$ & $Z_{11}(s)$



- Check stability of following polynomial by applying Routh criteria
 $Q(S) = S^3 + 2S^2 + 8S + 10$
- A series RL circuit with $R = 30\Omega$ & $L = 15H$ has constant voltage of $V = 60V$ applied at $t=0$ as shown in above figure. Find Current I and Voltage across R and L

**Q.5 Attempt any Two:**

12

- Design a constant K low pass filter (T & π section) having $f_c = 5KHz$ and design impedance $R_o = 800\Omega$
- Derive an expression of current, V_R & V_C for dc response of series RC circuit.
- Draw the pole-zero plot for the given network function and hence obtain $V(t)$.

Seat No.	
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Set	R
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Network Theory and Analysis (BTN04303)

Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
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 - 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) A band elimination filter is the one _____.
 - a) which attenuates all the frequencies less than lower cut off frequency
 - b) which attenuates all the frequencies greater than upper cut off frequency
 - c) frequencies lying between f_1 and f_2 are attenuated and all other frequencies are passed
 - d) frequencies lying between f_1 and f_2 are passed and all other are attenuated
- 2) In the m-derived high pass filters the resonant frequency is to be chosen so that it is _____.
 - a) Above the cut-off frequency
 - b) Below the cut-off frequency
 - c) Equal to the cut-off frequency
 - d) None of the above
- 3) When two port networks are connected in series, the parameters of the interconnected network can be conveniently expressed with help of _____.
 - a) Z parameter
 - b) h parameter
 - c) Y parameter
 - d) Transmission parameter
- 4) The system is said to be unstable if _____.
 - a) all the poles lie on right half of s plane
 - b) all the poles lie on left half of s plane
 - c) all poles do not lie on right half of s plane
 - d) both a and b
- 5) The time constant of a series RC circuit is _____.
 - a) RC
 - b) $\frac{R}{C}$
 - c) $\frac{C}{R}$
 - d) $\frac{1}{RC}$
- 6) Quality factor of series circuit RLC circuit is _____.
 - a) $\frac{\omega R}{L}$
 - b) $\frac{\omega L}{R}$
 - c) $\frac{\omega C}{R}$
 - d) $\frac{\omega R}{C}$

- 7) Maximum power is transferred when the load impedance is equal to _____.
a) Source impedance b) Zero
c) Half of Source Impedance d) none
- 8) The h parameters h_{12} and h_{22} are obtained by _____.
a) by shorting input terminals b) by shorting output terminals
c) by opening input terminals d) by opening output terminals
- 9) A capacitor $40\ \mu\text{F}$ and $8\ \text{mH}$ coil are in series across an ac source. The resonant frequency is _____.
a) $28.1\ \text{Hz}$ b) $281\ \text{Hz}$
c) $2810\ \text{Hz}$ d) $28.1\ \text{KHz}$
- 10) Norton's equivalent circuit consists of _____.
a) Voltage Source in parallel with resistance
b) Voltage Source in series with resistance
c) Current Source in parallel with resistance
d) Current Source in series with resistance
- 11) Which of the following circuits appears as a very high resistance at resonance?
a) series & parallel resonant b) series resonant
c) parallel resonant d) none of the above
- 12) The driving admittance ($Y_{11}(s)$) is defined as _____.
a) The ratio of transform voltage to transform current at the same port
b) The ratio of transform voltage at one port to transform current at the other port
c) The ratio of transform current at one port to transform voltage at the same port
d) The ratio of transform voltage at one port to transform voltage at the other port
- 13) The transient current in loss free LC circuit when excited from AC source is an _____ Sine wave.
a) un damped b) over damped
c) under damped d) critically damped
- 14) If a high pass filter having $L = 47.74\ \text{mH}$ and $C = 0.133\ \mu\text{F}$ then design impedance K will be _____.
a) $400\ \text{ohm}$ b) $500\ \text{ohm}$
c) $600\ \text{ohm}$ d) $650\ \text{ohm}$

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Network Theory and Analysis (BTN04303)

Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

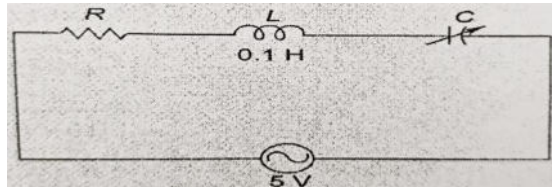
- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary and mention it clearly before the Solution.

Section – I

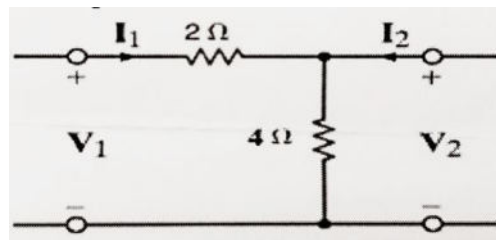
Q.2 Attempt any Four:

16

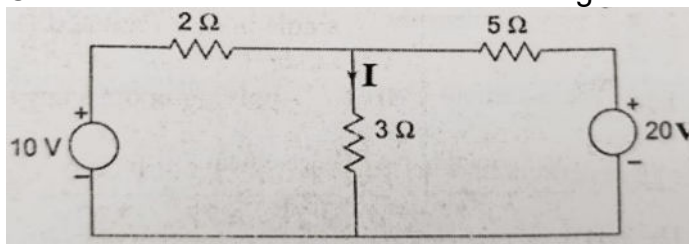
- Write a performance equation of a two-port network in terms of admittance parameters. How can these parameters be determined?
- In a series RLC circuit a maximum current of 0.1 A flows through circuit when the capacitor is $5\mu\text{f}$, inductor is 0.1H with a fixed frequency at voltage of 5V. Determine the frequency at which the circuit resonates, the bandwidth, the quality factor Q and the value of resistance at resonant frequency.
- In the circuit shown above a maximum current of 0.1A flows through the circuit when capacitor is at $5\mu\text{F}$ with fixed frequency and voltage of 5V. Determine frequency at which the circuit resonates, bandwidth, quality factor and resistance R.



- Find h parameter of above network.

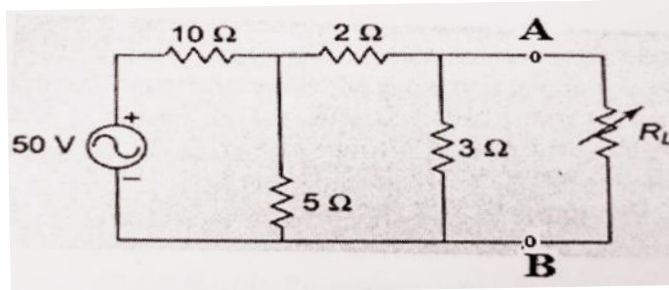


- Calculate the current I shown in above figure using millman's theorem.



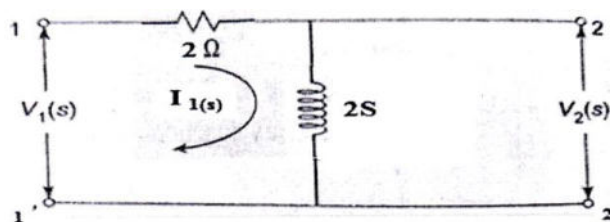
Q.3 Attempt any Two:

- Derive ABCD parameters in terms of Z and Y parameters.
- Derive an expression of resonant frequency for a parallel resonance circuit.
- Determine the maximum power delivered to load in the circuit shown above.

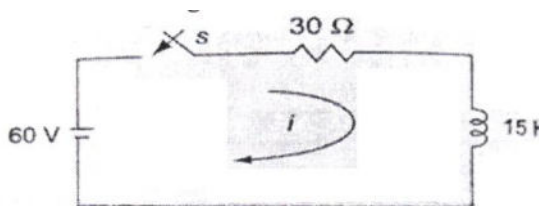
**Section – II****Q.4 Attempt any Four:**

16

- Design a π type attenuator to give 30dB attenuation & to have characteristics impedance of 200Ω .
- Derive an expression of cutoff frequency for constant K high pass filter.
- For above network obtain transfer function $G_{21}(s)$, $Z_{21}(s)$ & $Z_{11}(s)$



- Check stability of following polynomial by applying Routh criteria
 $Q(S) = S^3 + 2S^2 + 8S + 10$
- A series RL circuit with $R = 30\Omega$ & $L = 15H$ has constant voltage of $V = 60V$ applied at $t=0$ as shown in above figure. Find Current I and Voltage across R and L

**Q.5 Attempt any Two:**

12

- Design a constant K low pass filter (T & π section) having $f_c = 5KHz$ and design impedance $R_o = 800\Omega$
- Derive an expression of current, V_R & V_C for dc response of series RC circuit.
- Draw the pole-zero plot for the given network function and hence obtain $V(t)$.

Seat No.	
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Set	S
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Network Theory and Analysis (BTN04303)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
 - 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Norton's equivalent circuit consists of _____.
 - a) Voltage Source in parallel with resistance
 - b) Voltage Source in series with resistance
 - c) Current Source in parallel with resistance
 - d) Current Source in series with resistance
- 2) Which of the following circuits appears as a very high resistance at resonance?
 - a) series & parallel resonant
 - b) series resonant
 - c) parallel resonant
 - d) none of the above
- 3) The driving admittance (Y_{11} (s)) is defined as _____.
 - a) The ratio of transform voltage to transform current at the same port
 - b) The ratio of transform voltage at one port to transform current at the other port
 - c) The ratio of transform current at one port to transform voltage at the same port
 - d) The ratio of transform voltage at one port to transform voltage at the other port
- 4) The transient current in loss free LC circuit when excited from AC source is an _____ Sine wave.
 - a) un damped
 - b) over damped
 - c) under damped
 - d) critically damped
- 5) If a high pass filter having $L = 47.74\text{mH}$ and $C = 0.133\text{ }\mu\text{F}$ then design impedance K will be _____.
 - a) 400 ohm
 - b) 500 ohm
 - c) 600 ohm
 - d) 650 ohm

- 6) A band elimination filter is the one _____.
 a) which attenuates all the frequencies less than lower cut off frequency
 b) which attenuates all the frequencies greater than upper cut off frequency
 c) frequencies lying between f_1 and f_2 are attenuated and all other frequencies are passed
 d) frequencies lying between f_1 and f_2 are passed and all other are attenuated
- 7) In the m-derived high pass filters the resonant frequency is to be chosen so that it is _____.
 a) Above the cut-off frequency b) Below the cut-off frequency
 c) Equal to the cut-off frequency d) None of the above
- 8) When two port networks are connected in series, the parameters of the interconnected network can be conveniently expressed with help of _____.
 a) Z parameter b) h parameter
 c) Y parameter d) Transmission parameter
- 9) The system is said to be unstable if _____.
 a) all the poles lie on right half of s plane
 b) all the poles lie on left half of s plane
 c) all poles do not lie on right half of s plane
 d) both a and b
- 10) The time constant of a series RC circuit is _____.
 a) RC b) $\frac{R}{C}$
 c) $\frac{C}{R}$ d) $\frac{1}{RC}$
- 11) Quality factor of series circuit RLC circuit is _____.
 a) $\frac{\omega R}{L}$ b) $\frac{\omega L}{R}$
 c) $\frac{\omega C}{R}$ d) $\frac{\omega R}{C}$
- 12) Maximum power is transferred when the load impedance is equal to _____.
 a) Source impedance b) Zero
 c) Half of Source Impedance d) none
- 13) The h parameters h_{12} and h_{22} are obtained by _____.
 a) by shorting input terminals b) by shorting output terminals
 c) by opening input terminals d) by opening output terminals
- 14) A capacitor $40 \mu\text{F}$ and 8 mH coil are in series across an ac source. The resonant frequency is _____.
 a) 28.1 Hz b) 281 Hz
 c) 2810 Hz d) 28.1 KHz

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING**Network Theory and Analysis (BTN04303)**

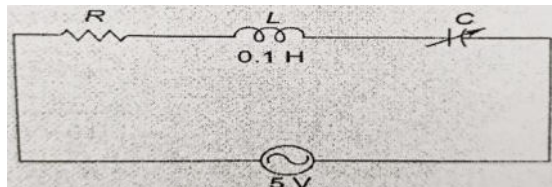
Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

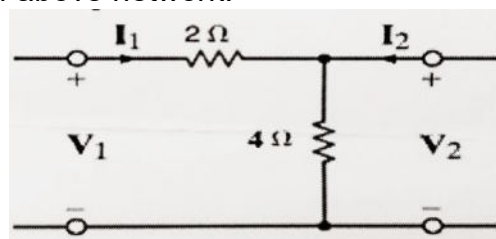
- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicates full marks.
3) Assume suitable data if necessary and mention it clearly before the Solution.

Section – I**Q.2 Attempt any Four:****16**

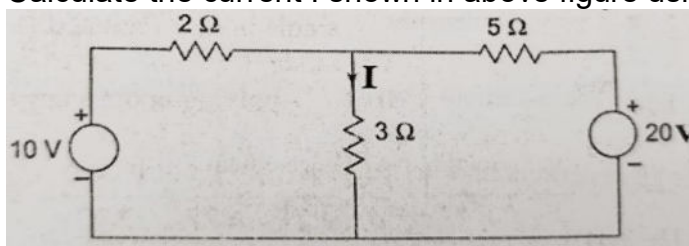
- a) Write a performance equation of a two-port network in terms of admittance parameters. How can these parameters be determined?
- b) In a series RLC circuit a maximum current of 0.1 A flows through circuit when the capacitor is $5\mu\text{f}$, inductor is 0.1H with a fixed frequency at voltage of 5V. Determine the frequency at which the circuit resonates, the bandwidth, the quality factor Q and the value of resistance at resonant frequency.
- c) In the circuit shown above a maximum current of 0.1A flows through the circuit when capacitor is at $5\mu\text{F}$ with fixed frequency and voltage of 5V. Determine frequency at which the circuit resonates, bandwidth, quality factor and resistance R.



- d) Find h parameter of above network.

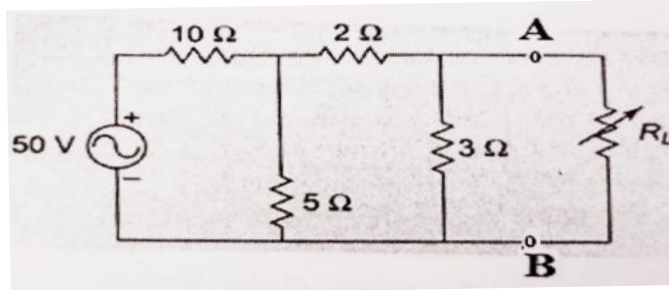


- e) Calculate the current I shown in above figure using millman's theorem.



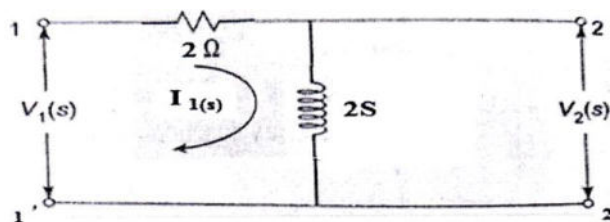
Q.3 Attempt any Two:

- Derive ABCD parameters in terms of Z and Y parameters.
- Derive an expression of resonant frequency for a parallel resonance circuit.
- Determine the maximum power delivered to load in the circuit shown above.

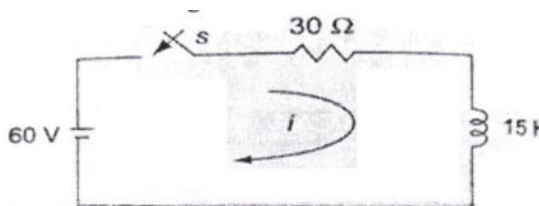
**Section – II****Q.4 Attempt any Four:**

16

- Design a π type attenuator to give 30dB attenuation & to have characteristics impedance of 200Ω .
- Derive an expression of cutoff frequency for constant K high pass filter.
- For above network obtain transfer function $G_{21}(s)$, $Z_{21}(s)$ & $Z_{11}(s)$



- Check stability of following polynomial by applying Routh criteria
 $Q(S) = S^3 + 2S^2 + 8S + 10$
- A series RL circuit with $R = 30\Omega$ & $L = 15H$ has constant voltage of $V = 60V$ applied at $t=0$ as shown in above figure. Find Current I and Voltage across R and L

**Q.5 Attempt any Two:**

12

- Design a constant K low pass filter (T & π section) having $f_c = 5KHz$ and design impedance $R_o = 800\Omega$
- Derive an expression of current, V_R & V_C for dc response of series RC circuit.
- Draw the pole-zero plot for the given network function and hence obtain $V(t)$.

Seat No.	
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Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if required.

Marks: 14

- 1) Which of the following law/rule can be used to determine the direction of rotation of D.C. motor?
a) Lenz's law
b) Faraday's law
c) Coulomb's law
d) Fleming's left-hand rule
- 2) In dc generators the change in voltage when the load is reduced from rated value to zero, expressed as a percentage of the rated load voltage, is known as _____.
a) Regulation
b) Armature reactance
c) External efficiency
d) Loss factor
- 3) In a D.C. generator the critical resistance refers to the resistance of _____.
a) Brushes
b) Field
c) Armature
d) Load
- 4) D.C. generator works on the principle of _____.
a) Lenz's law
b) Ohm's law
c) Faraday's law of electromagnetic induction
d) None of the above
- 5) One D.C. motor drives another D.C. motor. The second D.C. motor when excited and driven _____.
a) Does not run as a generator
b) Also runs as a motor comes to stop after sometime
c) Runs as a generator
d) None of these
- 6) In a low power factor wattmeter, the compensating coil is connected _____.
a) In series with current coil
b) In parallel with current coil
c) In series with pressure coil
d) In parallel with pressure coil

- 7) In a 3-phase power measurement by two wattmeter method, both the wattmeter's had identical readings. The power factor of the load was _____.
a) Unity
b) 0.8 lagging
c) 0.8 leading
d) zero
- 8) In induction motor works with _____.
a) DC only
b) AC only
c) Both AC and DC
d) None of these
- 9) A 50 Hz, 3-phase induction motor has a full load speed of 1500 rpm. The number of poles in the motor is _____.
a) 2 Pole
b) 4 Pole
c) 6 Pole
d) 8 Pole
- 10) As compared to DOL starting method the star delta starting method should have _____.
a) High torque
b) Low starting current
c) High starting current
d) Smooth acceleration
- 11) In a split-phase motor, the running winding should have _____.
a) High resistance and low inductance
b) High resistance and High inductance
c) Low resistance and high inductance
d) Low resistance and low inductance
- 12) If the capacitor of a single-phase motor is short-circuited _____.
a) The motor will not start
b) The motor will run in the same direction at a reduced speed
c) The motor will run in the reverse direction
d) None of the above
- 13) The transformer which is more feasible to use in the distribution ends should be _____.
a) Star-delta
b) Delta-star
c) Scott
d) Delta-delta
- 14) The open delta connection (V-V) is frequently used for _____.
a) two auto-transformers
b) three auto-transformers
c) four auto-transformers
d) five two auto-transformers

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Electrical Machines (BTN04304)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate.
3) Assume suitable data if required.

Section – I

Q.2 Solve any Four **16**

- a) Derive the EMF equation of a DC generator with its working principle.
- b) A dc generator generates an EMF of 420V and has 900 armature conductors, flux per pole of 0.012 wb, speed of 1500 rpm and the armature winding has 4 parallel paths, find the number of poles.
- c) A dc shunt motor takes a load current of 40A from a 230V dc power supply the armature and field resistance are 0.25 Ω and 220 Ω respectively. Find the armature torque when the motor runs at 960rpm.
- d) Derive the torque equation of a DC motor.
- e) Discuss the concept of power factor and identify the causes of low power factor in electrical systems.

Q.3 Solve (Any Two) **12**

- a) Describe different methods or schemes used for speed control of DC motors.
- b) An 8pole d.c. shunt generator with 778 wave connected armature conductors and running at 500 rpm supplies load of 12.5 Ω resistance at terminal voltage of 50V. The armature resistance is 0.24 Ω and field resistance is 250 Ω . Find armature current, induced emf and flux per pole.
- c) Describe the principle and procedure of the Two-Wattmeter Method for measuring three- phase power.

Section – II

Q.4 Attempt the following (Any four) **16**

- a) Describe the operation and working principle of a capacitor-start single-phase induction motor.
- b) A 3ph delta/star connected 11000/440V. 50Hz transformer takes line current of 5 amp, when secondary load of 0.8 Lagging power factor is connected. Determine each coil current and output of transformer.
- c) On which factor the speed of three phase induction motor depends? And how to control the speed of three phase induction motor?
- d) A 4 pole, 50 (Hz) three phase induction motor running with speed 1440 (rpm). Find synchronous speed, slip speed, slip for this condition.
- e) Draw neat diagram of star delta starter and explain its operation.

Q.5 Attempt the following. (Any Two)

- a)** Illustrate and explain the star-delta three-phase transformer connections.
Compare star- delta and delta- star three phase transformer connection.
- b)** Explain the operation, types, characteristics, and applications of a universal motor.
- c)** A 3-phase induction motor is wound for 4 pole, & is supplied from 50HZ system calculate:
 - i) The synchronous speed
 - ii) The speed of motor when the slip is 4%
 - iii) The rotor current frequency when the motor runs at 600rpm

Seat No.	
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Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if required.

Marks: 14

- 1) In induction motor works with _____.
a) DC only
b) AC only
c) Both AC and DC
d) None of these
- 2) A 50 Hz, 3-phase induction motor has a full load speed of 1500 rpm. The number of poles in the motor is _____.
a) 2 Pole
b) 4 Pole
c) 6 Pole
d) 8 Pole
- 3) As compared to DOL starting method the star delta starting method should have _____.
a) High torque
b) Low starting current
c) High starting current
d) Smooth acceleration
- 4) In a split-phase motor, the running winding should have _____.
a) High resistance and low inductance
b) High resistance and High inductance
c) Low resistance and high inductance
d) Low resistance and low inductance
- 5) If the capacitor of a single-phase motor is short-circuited _____.
a) The motor will not start
b) The motor will run in the same direction at a reduced speed
c) The motor will run in the reverse direction
d) None of the above
- 6) The transformer which is more feasible to use in the distribution ends should be _____.
a) Star-delta
b) Delta-star
c) Scott
d) Delta-delta
- 7) The open delta connection (V-V) is frequently used for _____.
a) two auto-transformers
b) three auto-transformers
c) four auto-transformers
d) five two auto-transformers

- 8) Which of the following law/rule can be used to determine the direction of rotation of D.C. motor?
- a) Lenz's law
 - b) Faraday's law
 - c) Coulomb's law
 - d) Fleming's left-hand rule
- 9) In dc generators the change in voltage when the load is reduced from rated value to zero, expressed as a percentage of the rated load voltage, is known as _____.
- a) Regulation
 - b) Armature reactance
 - c) External efficiency
 - d) Loss factor
- 10) In a D.C. generator the critical resistance refers to the resistance of _____.
- a) Brushes
 - b) Field
 - c) Armature
 - d) Load
- 11) D.C. generator works on the principle of _____.
- a) Lenz's law
 - b) Ohm's law
 - c) Faraday's law of electromagnetic induction
 - d) None of the above
- 12) One D.C. motor drives another D.C. motor. The second D.C. motor when excited and driven _____.
- a) Does not run as a generator
 - b) Also runs as a motor comes to stop after sometime
 - c) Runs as a generator
 - d) None of these
- 13) In a low power factor wattmeter, the compensating coil is connected _____.
- a) In series with current coil
 - b) In parallel with current coil
 - c) In series with pressure coil
 - d) In parallel with pressure coil
- 14) In a 3-phase power measurement by two wattmeter method, both the wattmeter's had identical readings. The power factor of the load was _____.
- a) Unity
 - b) 0.8 lagging
 - c) 0.8 leading
 - d) zero

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Electrical Machines (BTN04304)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate.
3) Assume suitable data if required.

Section – I

Q.2 Solve any Four **16**

- a) Derive the EMF equation of a DC generator with its working principle.
- b) A dc generator generates an EMF of 420V and has 900 armature conductors, flux per pole of 0.012 wb, speed of 1500 rpm and the armature winding has 4 parallel paths, find the number of poles.
- c) A dc shunt motor takes a load current of 40A from a 230V dc power supply the armature and field resistance are 0.25 Ω and 220 Ω respectively. Find the armature torque when the motor runs at 960rpm.
- d) Derive the torque equation of a DC motor.
- e) Discuss the concept of power factor and identify the causes of low power factor in electrical systems.

Q.3 Solve (Any Two) **12**

- a) Describe different methods or schemes used for speed control of DC motors.
- b) An 8pole d.c. shunt generator with 778 wave connected armature conductors and running at 500 rpm supplies load of 12.5 Ω resistance at terminal voltage of 50V. The armature resistance is 0.24 Ω and field resistance is 250 Ω . Find armature current, induced emf and flux per pole.
- c) Describe the principle and procedure of the Two-Wattmeter Method for measuring three- phase power.

Section – II

Q.4 Attempt the following (Any four) **16**

- a) Describe the operation and working principle of a capacitor-start single-phase induction motor.
- b) A 3ph delta/star connected 11000/440V. 50Hz transformer takes line current of 5 amp, when secondary load of 0.8 Lagging power factor is connected. Determine each coil current and output of transformer.
- c) On which factor the speed of three phase induction motor depends? And how to control the speed of three phase induction motor?
- d) A 4 pole, 50 (Hz) three phase induction motor running with speed 1440 (rpm). Find synchronous speed, slip speed, slip for this condition.
- e) Draw neat diagram of star delta starter and explain its operation.

Q.5 Attempt the following. (Any Two)

- a)** Illustrate and explain the star-delta three-phase transformer connections.
Compare star- delta and delta- star three phase transformer connection.
- b)** Explain the operation, types, characteristics, and applications of a universal motor.
- c)** A 3-phase induction motor is wound for 4 pole, & is supplied from 50HZ system calculate:
 - i) The synchronous speed
 - ii) The speed of motor when the slip is 4%
 - iii) The rotor current frequency when the motor runs at 600rpm

Seat No.	
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Set

R

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Electrical Machines (BTN04304)

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

- 1) In a split-phase motor, the running winding should have _____.
 a) High resistance and low inductance
 b) High resistance and High inductance
 c) Low resistance and high inductance
 d) Low resistance and low inductance
- 2) If the capacitor of a single-phase motor is short-circuited _____.
 a) The motor will not start
 b) The motor will run in the same direction at a reduced speed
 c) The motor will run in the reverse direction
 d) None of the above
- 3) The transformer which is more feasible to use in the distribution ends should be _____.
 a) Star-delta
 b) Delta-star
 c) Scott
 d) Delta-delta
- 4) The open delta connection (V-V) is frequently used for _____.
 a) two auto-transformers
 b) three auto-transformers
 c) four auto-transformers
 d) five two auto-transformers
- 5) Which of the following law/rule can be used to determine the direction of rotation of D.C. motor?
 a) Lenz's law
 b) Faraday's law
 c) Coulomb's law
 d) Fleming's left-hand rule
- 6) In dc generators the change in voltage when the load is reduced from rated value to zero, expressed as a percentage of the rated load voltage, is known as _____.
 a) Regulation
 b) Armature reactance
 c) External efficiency
 d) Loss factor
- 7) In a D.C. generator the critical resistance refers to the resistance of _____.
 a) Brushes
 b) Field
 c) Armature
 d) Load

- 8) D.C. generator works on the principle of _____.
a) Lenz's law
b) Ohm's law
c) Faraday's law of electromagnetic induction
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- 10) In a low power factor wattmeter, the compensating coil is connected _____.
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- 12) In induction motor works with _____.
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c) Both AC and DC
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- 13) A 50 Hz, 3-phase induction motor has a full load speed of 1500 rpm. The number of poles in the motor is _____.
a) 2 Pole
b) 4 Pole
c) 6 Pole
d) 8 Pole
- 14) As compared to DOL starting method the star delta starting method should have _____.
a) High torque
b) Low starting current
c) High starting current
d) Smooth acceleration

Seat No.	
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Set R

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Electrical Machines (BTN04304)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate.
3) Assume suitable data if required.

Section – I

Q.2 Solve any Four **16**

- a) Derive the EMF equation of a DC generator with its working principle.
- b) A dc generator generates an EMF of 420V and has 900 armature conductors, flux per pole of 0.012 wb, speed of 1500 rpm and the armature winding has 4 parallel paths, find the number of poles.
- c) A dc shunt motor takes a load current of 40A from a 230V dc power supply the armature and field resistance are 0.25 Ω and 220 Ω respectively. Find the armature torque when the motor runs at 960rpm.
- d) Derive the torque equation of a DC motor.
- e) Discuss the concept of power factor and identify the causes of low power factor in electrical systems.

Q.3 Solve (Any Two) **12**

- a) Describe different methods or schemes used for speed control of DC motors.
- b) An 8pole d.c. shunt generator with 778 wave connected armature conductors and running at 500 rpm supplies load of 12.5 Ω resistance at terminal voltage of 50V. The armature resistance is 0.24 Ω and field resistance is 250 Ω . Find armature current, induced emf and flux per pole.
- c) Describe the principle and procedure of the Two-Wattmeter Method for measuring three- phase power.

Section – II

Q.4 Attempt the following (Any four) **16**

- a) Describe the operation and working principle of a capacitor-start single-phase induction motor.
- b) A 3ph delta/star connected 11000/440V. 50Hz transformer takes line current of 5 amp, when secondary load of 0.8 Lagging power factor is connected. Determine each coil current and output of transformer.
- c) On which factor the speed of three phase induction motor depends? And how to control the speed of three phase induction motor?
- d) A 4 pole, 50 (Hz) three phase induction motor running with speed 1440 (rpm). Find synchronous speed, slip speed, slip for this condition.
- e) Draw neat diagram of star delta starter and explain its operation.

Q.5 Attempt the following. (Any Two)

- a)** Illustrate and explain the star-delta three-phase transformer connections.
Compare star- delta and delta- star three phase transformer connection.
- b)** Explain the operation, types, characteristics, and applications of a universal motor.
- c)** A 3-phase induction motor is wound for 4 pole, & is supplied from 50HZ system calculate:
 - i) The synchronous speed
 - ii) The speed of motor when the slip is 4%
 - iii) The rotor current frequency when the motor runs at 600rpm

Seat No.	
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Set S

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Electrical Machines (BTN04304)

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternative from the options and rewrite the sentence. 14

- 1) In a low power factor wattmeter, the compensating coil is connected _____.
 a) In series with current coil
 b) In parallel with current coil
 c) In series with pressure coil
 d) In parallel with pressure coil
- 2) In a 3-phase power measurement by two wattmeter method, both the wattmeter's had identical readings. The power factor of the load was _____.
 a) Unity
 b) 0.8 lagging
 c) 0.8 leading
 d) zero
- 3) In induction motor works with _____.
 a) DC only
 b) AC only
 c) Both AC and DC
 d) None of these
- 4) A 50 Hz, 3-phase induction motor has a full load speed of 1500 rpm. The number of poles in the motor is _____.
 a) 2 Pole
 b) 4 Pole
 c) 6 Pole
 d) 8 Pole
- 5) As compared to DOL starting method the star delta starting method should have _____.
 a) High torque
 b) Low starting current
 c) High starting current
 d) Smooth acceleration
- 6) In a split-phase motor, the running winding should have _____.
 a) High resistance and low inductance
 b) High resistance and High inductance
 c) Low resistance and high inductance
 d) Low resistance and low inductance
- 7) If the capacitor of a single-phase motor is short-circuited _____.
 a) The motor will not start
 b) The motor will run in the same direction at a reduced speed
 c) The motor will run in the reverse direction
 d) None of the above

Seat No.	
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Set S

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Electrical Machines (BTN04304)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate.
3) Assume suitable data if required.

Section – I

Q.2 Solve any Four **16**

- a) Derive the EMF equation of a DC generator with its working principle.
- b) A dc generator generates an EMF of 420V and has 900 armature conductors, flux per pole of 0.012 wb, speed of 1500 rpm and the armature winding has 4 parallel paths, find the number of poles.
- c) A dc shunt motor takes a load current of 40A from a 230V dc power supply the armature and field resistance are 0.25 Ω and 220 Ω respectively. Find the armature torque when the motor runs at 960rpm.
- d) Derive the torque equation of a DC motor.
- e) Discuss the concept of power factor and identify the causes of low power factor in electrical systems.

Q.3 Solve (Any Two) **12**

- a) Describe different methods or schemes used for speed control of DC motors.
- b) An 8pole d.c. shunt generator with 778 wave connected armature conductors and running at 500 rpm supplies load of 12.5 Ω resistance at terminal voltage of 50V. The armature resistance is 0.24 Ω and field resistance is 250 Ω . Find armature current, induced emf and flux per pole.
- c) Describe the principle and procedure of the Two-Wattmeter Method for measuring three- phase power.

Section – II

Q.4 Attempt the following (Any four) **16**

- a) Describe the operation and working principle of a capacitor-start single-phase induction motor.
- b) A 3ph delta/star connected 11000/440V. 50Hz transformer takes line current of 5 amp, when secondary load of 0.8 Lagging power factor is connected. Determine each coil current and output of transformer.
- c) On which factor the speed of three phase induction motor depends? And how to control the speed of three phase induction motor?
- d) A 4 pole, 50 (Hz) three phase induction motor running with speed 1440 (rpm). Find synchronous speed, slip speed, slip for this condition.
- e) Draw neat diagram of star delta starter and explain its operation.

Q.5 Attempt the following. (Any Two)

- a)** Illustrate and explain the star-delta three-phase transformer connections.
Compare star- delta and delta- star three phase transformer connection.
- b)** Explain the operation, types, characteristics, and applications of a universal motor.
- c)** A 3-phase induction motor is wound for 4 pole, & is supplied from 50HZ system calculate:
 - i) The synchronous speed
 - ii) The speed of motor when the slip is 4%
 - iii) The rotor current frequency when the motor runs at 600rpm

Seat No.	
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Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.

- ### MCQ/Objective Type Questions

Marks:14

14

- Page 1 of 16

- 9) CPLD is _____.
a) Complex programmable logic devices
b) Complementary programmable logic devices
c) Common programmable logic devices
d) Complex logic devices
- 10) How many NOT gates are required for the construction of a 4-to-1 multiplexer?
a) 3
b) 4
c) 2
d) 5
- 11) In PROM _____.
a) AND is fixed and OR is programmable
b) AND is fixed and OR is fixed
c) AND is programmable and OR is programmable
d) AND and OR both are non- programmable
- 12) In Mealy machine output is depends upon _____.
a) External input
b) Present state and external input
c) Initial state and external input
d) Past input
- 13) Which of the following code is used in k-map for representing the terms?
a) Ex-3 Code
b) BCD Code
c) Binary Code
d) Gray Code
- 14) The given maxterm is $A + B + C$, its equivalent binary represented is _____.
a) 101
b) 110
c) 111
d) 000

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Digital Techniques (BTN04305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 3) Assume suitable data if required.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four: **16**

- Convert binary equivalent 100111 to Gray code number.
Convert gray equivalent 11100110 to binary code number.
- Simplify using Boolean Laws
 $AB + A BC + A\bar{B}$
- Convert following expression into standard POS
 $F(A, B, C) = (A + C)(B + C)(A + \bar{B})$
- Construct 4:1 multiplexer using basic gates.
- Construct half subtractor using logic gates.

Q.3 Attempt any Two: **12**

- What is significance of hamming code? Encode the binary word 1011 in to seven-bit hamming code
- Minimize the following Boolean expression using K map and realize it using basic gates
 $Y = \sum m(1,3,5,9,11,13)$
- Construct full adder using logic gates.

Section – II

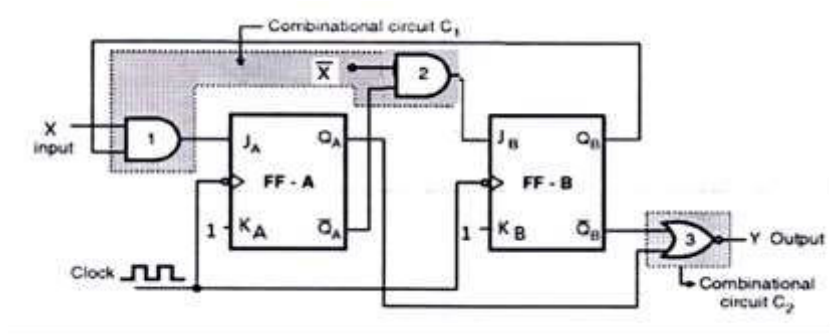
Q.4 Attempt any Four: **16**

- What is Moore machine? Explain with suitable logic diagram.
- Design 2-bit asynchronous up counter. Draw neat logic diagram and waveforms.
- What is shift register? Draw neat logic diagram and waveforms for serial in parallel out shift register.
- Construct positive edge triggered JK flipflop and tabulate characteristics table.
- Compare Moore and Mealy machine with suitable logic diagram.

Q.5 Attempt any Two: **12**

- Implement the following Boolean function using PAL
 $A = \bar{X}YZ + XYZ + X\bar{Y}Z$ $B = X\bar{Y}Z + XY\bar{Z} + \bar{X}Y\bar{Z}$
- What is flip-flop? Construct positive edge triggered SR flipflop using NAND gate and tabulate characteristics table.

- c) Identify the given circuit, construct the excitation table, transition table and state diagram for circuit given below.



Seat No.	
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Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.

- ### MCQ/Objective Type Questions

Marks:14

14

- Page 5 of 16

- 8) If both inputs are LOW, output is LOW in _____ gate.
 - a) OR
 - b) NOR
 - c) NAND
 - d) XNOR
- 9) What is the function of an enable input on a multiplexer chip?
 - a) To apply Vcc
 - b) To connect ground
 - c) To active the entire chip
 - d) To active one half of the chip
- 10) Many outputs and only one input is _____.
 - a) Multiplexer
 - b) Demultiplexer
 - c) Decoder
 - d) Code converter
- 11) A basic S-R flip-flop can be constructed by cross-coupling of which basic logic gates?
 - a) AND or OR gates
 - b) XOR or XNOR gates
 - c) NOR or NAND gates
 - d) AND or NOR gates
- 12) In a JK-Flip Flop, when $J=1$ and $K=1$ then it will be considered as _____.
 - a) Set condition
 - b) Reset condition
 - c) No Change
 - d) Toggle condition
- 13) _____ Machine requires more number of states.
 - a) Moore
 - b) Mealy
 - c) Moore & Mealy
 - d) None
- 14) Each individual term in a standard SOP is called as _____.
 - a) Minterm
 - b) Maxterm
 - c) Complex normal form
 - d) Complex term

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Digital Techniques (BTN04305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if required.

Section – I

Q.2 Attempt any Four: **16**

- Convert binary equivalent 100111 to Gray code number.
Convert gray equivalent 11100110 to binary code number.
- Simplify using Boolean Laws
 $AB + A BC + A\bar{B}$
- Convert following expression into standard POS
 $F(A, B, C) = (A + C)(B + C)(A + \bar{B})$
- Construct 4:1 multiplexer using basic gates.
- Construct half subtractor using logic gates.

Q.3 Attempt any Two: **12**

- What is significance of hamming code? Encode the binary word 1011 in to seven-bit hamming code
- Minimize the following Boolean expression using K map and realize it using basic gates
 $Y = \sum m(1,3,5,9,11,13)$
- Construct full adder using logic gates.

Section – II

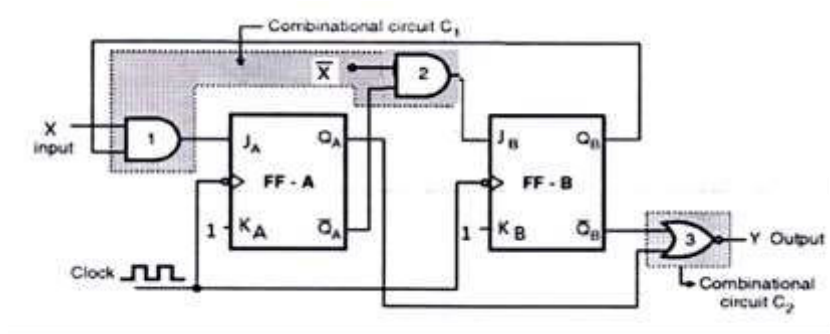
Q.4 Attempt any Four: **16**

- What is Moore machine? Explain with suitable logic diagram.
- Design 2-bit asynchronous up counter. Draw neat logic diagram and waveforms.
- What is shift register? Draw neat logic diagram and waveforms for serial in parallel out shift register.
- Construct positive edge triggered JK flipflop and tabulate characteristics table.
- Compare Moore and Mealy machine with suitable logic diagram.

Q.5 Attempt any Two: **12**

- Implement the following Boolean function using PAL
 $A = \bar{X}YZ + XYZ + X\bar{Y}Z$ $B = X\bar{Y}Z + XY\bar{Z} + \bar{X}Y\bar{Z}$
- What is flip-flop? Construct positive edge triggered SR flipflop using NAND gate and tabulate characteristics table.

- c) Identify the given circuit, construct the excitation table, transition table and state diagram for circuit given below.



Seat No.	
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Set R

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Digital Techniques (BTN04305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the option.**14**

- 1) In PROM _____.
 a) AND is fixed and OR is programmable
 b) AND is fixed and OR is fixed
 c) AND is programmable and OR is programmable
 d) AND and OR both are non- programmable
- 2) In Mealy machine output is depends upon _____.
 a) External input
 b) Present state and external input
 c) Initial state and external input
 d) Past input
- 3) Which of the following code is used in k-map for representing the terms?
 a) Ex-3 Code
 b) BCD Code
 c) Binary Code
 d) Gray Code
- 4) The given maxterm is $A + B + C$, its equivalent binary represented is _____.
 a) 101
 b) 110
 c) 111
 d) 000
- 5) If both inputs are LOW, output is LOW in _____ gate.
 a) OR
 b) NOR
 c) NAND
 d) XNOR
- 6) What is the function of an enable input on a multiplexer chip?
 a) To apply V_{cc}
 b) To connect ground
 c) To active the entire chip
 d) To active one half of the chip
- 7) Many outputs and only one input is _____.
 a) Multiplexer
 b) Demultiplexer
 c) Decoder
 d) Code converter
- 8) A basic S-R flip-flop can be constructed by cross-coupling of which basic logic gates?
 a) AND or OR gates
 b) XOR or XNOR gates
 c) NOR or NAND gates
 d) AND or NOR gates

- 9) In a JK-Flip Flop, when $J=1$ and $K=1$ then it will be considered as _____.
 - a) Set condition
 - b) Reset condition
 - c) No Change
 - d) Toggle condition
- 10) _____ Machine requires more number of states.
 - a) Moore
 - b) Mealy
 - c) Moore & Mealy
 - d) None
- 11) Each individual term in a standard SOP is called as _____.
 - a) Minterm
 - b) Maxterm
 - c) Complex normal form
 - d) Complex term
- 12) _____ are the methods used to represent negative integer numbers.
 - a) 1's complement
 - b) 2's complement
 - c) Sign magnitude
 - d) All above
- 13) CPLD is _____.
 - a) Complex programmable logic devices
 - b) Complementary programmable logic devices
 - c) Common programmable logic devices
 - d) Complex logic devices
- 14) How many NOT gates are required for the construction of a 4-to-1 multiplexer?
 - a) 3
 - b) 4
 - c) 2
 - d) 5

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Digital Techniques (BTN04305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if required.

Section – I

Q.2 Attempt any Four: **16**

- Convert binary equivalent 100111 to Gray code number.
Convert gray equivalent 11100110 to binary code number.
- Simplify using Boolean Laws
 $AB + A BC + A \bar{B}$
- Convert following expression into standard POS
 $F(A, B, C) = (A + C)(B + C)(A + \bar{B})$
- Construct 4:1 multiplexer using basic gates.
- Construct half subtractor using logic gates.

Q.3 Attempt any Two: **12**

- What is significance of hamming code? Encode the binary word 1011 in to seven-bit hamming code
- Minimize the following Boolean expression using K map and realize it using basic gates
 $Y = \sum m(1, 3, 5, 9, 11, 13)$
- Construct full adder using logic gates.

Section – II

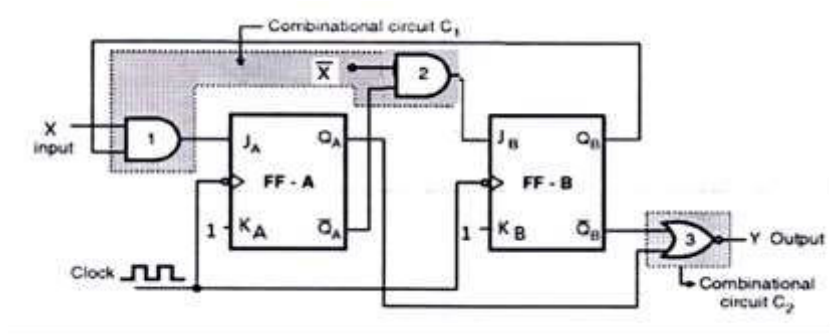
Q.4 Attempt any Four: **16**

- What is Moore machine? Explain with suitable logic diagram.
- Design 2-bit asynchronous up counter. Draw neat logic diagram and waveforms.
- What is shift register? Draw neat logic diagram and waveforms for serial in parallel out shift register.
- Construct positive edge triggered JK flipflop and tabulate characteristics table.
- Compare Moore and Mealy machine with suitable logic diagram.

Q.5 Attempt any Two: **12**

- Implement the following Boolean function using PAL
 $A = \bar{X}YZ + XYZ + X\bar{Y}Z \quad B = X\bar{Y}Z + XY\bar{Z} + \bar{X}Y\bar{Z}$
- What is flip-flop? Construct positive edge triggered SR flipflop using NAND gate and tabulate characteristics table.

- c) Identify the given circuit, construct the excitation table, transition table and state diagram for circuit given below.



Seat No.	
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Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.

- ### MCQ/Objective Type Questions

Marks:14

14

- Page 13 of 16

- 8) Which of the following code is used in k-map for representing the terms?

 - a) Ex-3 Code
 - b) BCD Code
 - c) Binary Code
 - d) Gray Code
- 9) The given maxterm is $A + B + C$, its equivalent binary represented is ____.

 - a) 101
 - b) 110
 - c) 111
 - d) 000
- 10) If both inputs are LOW, output is LOW in _____ gate.

 - a) OR
 - b) NOR
 - c) NAND
 - d) XNOR
- 11) What is the function of an enable input on a multiplexer chip?

 - a) To apply Vcc
 - b) To connect ground
 - c) To active the entire chip
 - d) To active one half of the chip
- 12) Many outputs and only one input is ____.

 - a) Multiplexer
 - b) Demultiplexer
 - c) Decoder
 - d) Code converter
- 13) A basic S-R flip-flop can be constructed by cross-coupling of which basic logic gates?

 - a) AND or OR gates
 - b) XOR or XNOR gates
 - c) NOR or NAND gates
 - d) AND or NOR gates
- 14) In a JK-Flip Flop, when J=1 and K=1 then it will be considered as ____.

 - a) Set condition
 - b) Reset condition
 - c) No Change
 - d) Toggle condition

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Digital Techniques (BTN04305)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if required.

Section – I

Q.2 Attempt any Four: **16**

- Convert binary equivalent 100111 to Gray code number.
Convert gray equivalent 11100110 to binary code number.
- Simplify using Boolean Laws
 $AB + A BC + A\bar{B}$
- Convert following expression into standard POS
 $F(A, B, C) = (A + C)(B + C)(A + \bar{B})$
- Construct 4:1 multiplexer using basic gates.
- Construct half subtractor using logic gates.

Q.3 Attempt any Two: **12**

- What is significance of hamming code? Encode the binary word 1011 in to seven-bit hamming code
- Minimize the following Boolean expression using K map and realize it using basic gates
 $Y = \sum m(1,3,5,9,11,13)$
- Construct full adder using logic gates.

Section – II

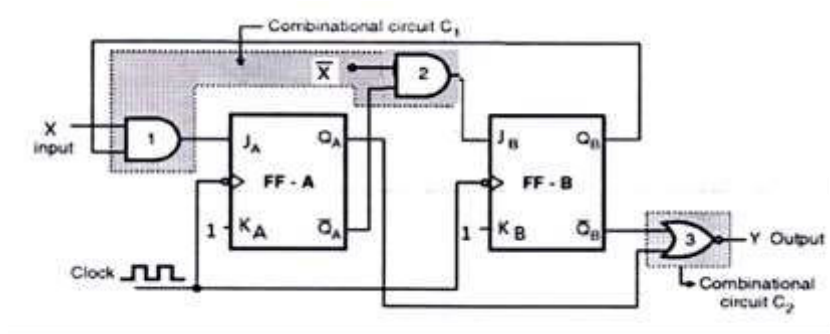
Q.4 Attempt any Four: **16**

- What is Moore machine? Explain with suitable logic diagram.
- Design 2-bit asynchronous up counter. Draw neat logic diagram and waveforms.
- What is shift register? Draw neat logic diagram and waveforms for serial in parallel out shift register.
- Construct positive edge triggered JK flipflop and tabulate characteristics table.
- Compare Moore and Mealy machine with suitable logic diagram.

Q.5 Attempt any Two: **12**

- Implement the following Boolean function using PAL
 $A = \bar{X}YZ + XYZ + X\bar{Y}Z$ $B = X\bar{Y}Z + XY\bar{Z} + \bar{X}Y\bar{Z}$
- What is flip-flop? Construct positive edge triggered SR flipflop using NAND gate and tabulate characteristics table.

- c) Identify the given circuit, construct the excitation table, transition table and state diagram for circuit given below.



Seat No.	
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Set P

S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

ELECTRONICS ENGINEERING

Electronic Circuit Analysis and Design (BTN04302)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) The current ratio of I_C/I_E is called _____ and it is usually less than one.
 - a) Beta
 - b) Alpha
 - c) Theta
 - d) Gamma
- 2) The base of a transistor is _____ doped.
 - a) heavily
 - b) moderately
 - c) lightly
 - d) none of given
- 3) A transistor is a _____ operated device.
 - a) power
 - b) current
 - c) voltage
 - d) resistor
- 4) In CE configuration the input V-I characteristics are drawn by taking
 - a) VCE vs. I_C for constant value of I_E
 - b) V_{BE} vs. I_E for constant value of VCE
 - c) V_{BE} vs. I_B for constant value of I_C
 - d) V_{BE} vs. I_B for constant value of VCB
- 5) The phase difference between the input and output voltages in a common emitter arrangement is _____.
 - a) 90 degrees
 - b) 100 degrees
 - c) 180 degrees
 - d) 270 degrees
- 6) One of the purposes of negative feedback is to _____.
 - a) increase noise
 - b) decrease harmonic distortion
 - c) increase the voltage gain
 - d) decrease the bandwidth
- 7) If a transistor operates at the middle of the dc load line, a increase in the current gain will move the Q point _____.
 - a) off the load line
 - b) no where
 - c) up
 - d) down
- 8) For VVR application MOSFET is operated in _____ region.
 - a) ohmic
 - b) saturation
 - c) pinch-off
 - d) both b& c

- 9) The basic purpose of filter is to _____
a) minimize variations in ac input signal
b) suppress harmonics in rectified output
c) remove ripples from the rectified output
d) stabilize dc output voltage
- 10) What is thermal Stability factor?
a) Ratio of change in collector current to change in a leakage current
b) Ratio of change in collector current to change in base current
c) Current amplification factor
d) Ratio of base current to collector current
- 11) What would be the value of feedback voltage in a negative feedback amplifier with $A=100$; $\beta =0.03$ and input signal voltage = 40mv?
a) 0.03V
b) 0.03
c) 0.09V
d) 0.12V
- 12) JFET is also called _____ transistor
a) unipolar
b) bipolar
c) unijunction
d) None of above
- 13) In a JFET, I_{DSS} is known as _____
a) drain to source current
b) drain to source current with gate shorted
c) drain to source current with gate open
d) none of the above
- 14) What is the purpose of RC or transformer coupling?
a) To separate bias of one stage from another
b) Increase thermal stability
c) Increase efficiency
d) To block a.c

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

ELECTRONICS ENGINEERING

Electronic Circuit Analysis and Design (BTN04302)

Day & Date: Friday, 17-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary.
 - 4) Draw neat and labeled diagrams wherever necessary.

Section – I

Q.2 Attempt any FOUR. **16**

- a) Draw circuit diagram of positive and negative clamper using diode and explain their functioning.
- b) Compare the performance of C, L and LC filters.
- c) Describe BJT application as switch.
- d) Describe Early effect in case of BJT.
- e) Draw collector to base bias circuit for BJT and derive formula of its stability factor.

Q.3 Attempt any TWO. **12**

- a) Draw circuit diagram of capacitor shunt filter connected with full wave rectifier. Derive an expression to determine its ripple factor.
- b) Draw circuit using h-model for BJT for CB, BE and CC configuration and define expression for current gain, voltage gain, output resistance and input resistance.
- c) Design a full wave rectifier with an LC filter to provide 15 V DC at 50 mA with maximum ripple of 3 %. Assume input frequency $f = 50$ Hz.

Section – II

Q.4 Attempt any FOUR. **16**

- a) Compare FET and MOSFET.
- b) Draw basic block diagram showing negative concept. Find expression for finding voltage gain with feedback. What is loop gain?
- c) Describe single stage CE amplifier functioning. What is bandwidth in case of CE amplifier.
- d) Describe thermal runaway in the case of BJT.
- e) Describe procedure to draw DC load line for CE amplifier.

Q.5 Attempt any TWO. **12**

- a) Draw CB, CE and CC transistor configuration and plot their input/output characteristics.
- b) Draw circuit diagram for current-series feedback in transistorized circuit and determine its current gain, voltage gain and input resistance with feedback.
- c) Describe construction and functioning of E-type p-channel MOSFET.

Seat No.	
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Set **Q**

S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

ELECTRONICS ENGINEERING**Electronic Circuit Analysis and Design (BTN04302)**

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.**14**

- 1) For VVR application MOSFET is operated in _____ region.
 - a) ohmic
 - b) saturation
 - c) pinch-off
 - d) both b& c
- 2) The basic purpose of filter is to _____.
 - a) minimize variations in ac input signal
 - b) suppress harmonics in rectified output
 - c) remove ripples from the rectified output
 - d) stabilize dc output voltage
- 3) What is thermal Stability factor?
 - a) Ratio of change in collector current to change in a leakage current
 - b) Ratio of change in collector current to change in base current
 - c) Current amplification factor
 - d) Ratio of base current to collector current
- 4) What would be the value of feedback voltage in a negative feedback amplifier with $A=100$; $\beta=0.03$ and input signal voltage = 40mv?
 - a) 0.03V
 - b) 0.03
 - c) 0.09V
 - d) 0.12V
- 5) JFET is also called _____ transistor
 - a) unipolar
 - b) bipolar
 - c) unijunction
 - d) None of above
- 6) In a JFET, I_{DSS} is known as _____.
 - a) drain to source current
 - b) drain to source current with gate shorted
 - c) drain to source current with gate open
 - d) none of the above

- 7) What is the purpose of RC or transformer coupling?
a) To separate bias of one stage from another
b) Increase thermal stability
c) Increase efficiency
d) To block a.c
- 8) The current ratio of I_C/I_E is called _____ and it is usually less than one.
a) Beta
b) Alpha
c) Theta
d) Gamma
- 9) The base of a transistor is _____ doped.
a) heavily
b) moderately
c) lightly
d) none of given
- 10) A transistor is a _____ operated device.
a) power
b) current
c) voltage
d) resistor
- 11) In CE configuration the input V-I characteristics are drawn by taking
a) V_{CE} vs. I_C for constant value of I_E
b) V_{BE} vs. I_E for constant value of V_{CE}
c) V_{BE} vs. I_B for constant value of I_C
d) V_{BE} vs. I_B for constant value of V_{CB}
- 12) The phase difference between the input and output voltages in a common emitter arrangement is _____.
a) 90 degrees
b) 100 degrees
c) 180 degrees
d) 270 degrees
- 13) One of the purposes of negative feedback is to _____.
a) increase noise
b) decrease harmonic distortion
c) increase the voltage gain
d) decrease the bandwidth
- 14) If a transistor operates at the middle of the dc load line, a increase in the current gain will move the Q point _____.
a) off the load line
b) no where
c) up
d) down

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

ELECTRONICS ENGINEERING

Electronic Circuit Analysis and Design (BTN04302)

Day & Date: Friday, 17-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary.
 - 4) Draw neat and labeled diagrams wherever necessary.

Section – I

Q.2 Attempt any FOUR. **16**

- a) Draw circuit diagram of positive and negative clamper using diode and explain their functioning.
- b) Compare the performance of C, L and LC filters.
- c) Describe BJT application as switch.
- d) Describe Early effect in case of BJT.
- e) Draw collector to base bias circuit for BJT and derive formula of its stability factor.

Q.3 Attempt any TWO. **12**

- a) Draw circuit diagram of capacitor shunt filter connected with full wave rectifier. Derive an expression to determine its ripple factor.
- b) Draw circuit using h-model for BJT for CB, BE and CC configuration and define expression for current gain, voltage gain, output resistance and input resistance.
- c) Design a full wave rectifier with an LC filter to provide 15 V DC at 50 mA with maximum ripple of 3 %. Assume input frequency $f = 50$ Hz.

Section – II

Q.4 Attempt any FOUR. **16**

- a) Compare FET and MOSFET.
- b) Draw basic block diagram showing negative concept. Find expression for finding voltage gain with feedback. What is loop gain?
- c) Describe single stage CE amplifier functioning. What is bandwidth in case of CE amplifier.
- d) Describe thermal runaway in the case of BJT.
- e) Describe procedure to draw DC load line for CE amplifier.

Q.5 Attempt any TWO. **12**

- a) Draw CB, CE and CC transistor configuration and plot their input/output characteristics.
- b) Draw circuit diagram for current-series feedback in transistorized circuit and determine its current gain, voltage gain and input resistance with feedback.
- c) Describe construction and functioning of E-type p-channel MOSFET.

Seat No.	
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Set **R**

S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

ELECTRONICS ENGINEERING**Electronic Circuit Analysis and Design (BTN04302)**

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.**14**

- 1) What would be the value of feedback voltage in a negative feedback amplifier with $A=100$; $\beta = 0.03$ and input signal voltage = 40mv?
 - a) 0.03V
 - b) 0.03
 - c) 0.09V
 - d) 0.12V
- 2) JFET is also called _____ transistor
 - a) unipolar
 - b) bipolar
 - c) unijunction
 - d) None of above
- 3) In a JFET, I_{DSS} is known as _____
 - a) drain to source current
 - b) drain to source current with gate shorted
 - c) drain to source current with gate open
 - d) none of the above
- 4) What is the purpose of RC or transformer coupling?
 - a) To separate bias of one stage from another
 - b) Increase thermal stability
 - c) Increase efficiency
 - d) To block a.c
- 5) The current ratio of I_C/I_E is called _____ and it is usually less than one.
 - a) Beta
 - b) Alpha
 - c) Theta
 - d) Gamma
- 6) The base of a transistor is _____ doped.
 - a) heavily
 - b) moderately
 - c) lightly
 - d) none of given
- 7) A transistor is a _____ operated device.
 - a) power
 - b) current
 - c) voltage
 - d) resistor

- 8) In CE configuration the input V-I characteristics are drawn by taking
a) VCE vs. IC for constant value of IE
b) VBE vs. IE for constant value of VCE
c) VBE vs. IB for constant value of IC
d) VBE vs. IB for constant value of VCB
- 9) The phase difference between the input and output voltages in a common emitter arrangement is _____
a) 90 degrees
b) 100 degrees
c) 180 degrees
d) 270 degrees
- 10) One of the purposes of negative feedback is to _____
a) increase noise
b) decrease harmonic distortion
c) increase the voltage gain
d) decrease the bandwidth
- 11) If a transistor operates at the middle of the dc load line, a increase in the current gain will move the Q point _____
a) off the load line
b) no where
c) up
d) down
- 12) For VVR application MOSFET is operated in _____ region.
a) ohmic
b) saturation
c) pinch-off
d) both b& c
- 13) The basic purpose of filter is to _____
a) minimize variations in ac input signal
b) suppress harmonics in rectified output
c) remove ripples from the rectified output
d) stabilize dc output voltage
- 14) What is thermal Stability factor?
a) Ratio of change in collector current to change in a leakage current
b) Ratio of change in collector current to change in base current
c) Current amplification factor
d) Ratio of base current to collector current

Seat No.	
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

ELECTRONICS ENGINEERING

Electronic Circuit Analysis and Design (BTN04302)

Day & Date: Friday, 17-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary.
 - 4) Draw neat and labeled diagrams wherever necessary.

Section – I

Q.2 Attempt any FOUR. **16**

- a) Draw circuit diagram of positive and negative clamper using diode and explain their functioning.
- b) Compare the performance of C, L and LC filters.
- c) Describe BJT application as switch.
- d) Describe Early effect in case of BJT.
- e) Draw collector to base bias circuit for BJT and derive formula of its stability factor.

Q.3 Attempt any TWO. **12**

- a) Draw circuit diagram of capacitor shunt filter connected with full wave rectifier. Derive an expression to determine its ripple factor.
- b) Draw circuit using h-model for BJT for CB, BE and CC configuration and define expression for current gain, voltage gain, output resistance and input resistance.
- c) Design a full wave rectifier with an LC filter to provide 15 V DC at 50 mA with maximum ripple of 3 %. Assume input frequency $f = 50$ Hz.

Section – II

Q.4 Attempt any FOUR. **16**

- a) Compare FET and MOSFET.
- b) Draw basic block diagram showing negative concept. Find expression for finding voltage gain with feedback. What is loop gain?
- c) Describe single stage CE amplifier functioning. What is bandwidth in case of CE amplifier.
- d) Describe thermal runaway in the case of BJT.
- e) Describe procedure to draw DC load line for CE amplifier.

Q.5 Attempt any TWO. **12**

- a) Draw CB, CE and CC transistor configuration and plot their input/output characteristics.
- b) Draw circuit diagram for current-series feedback in transistorized circuit and determine its current gain, voltage gain and input resistance with feedback.
- c) Describe construction and functioning of E-type p-channel MOSFET.

- 8) In a JFET, I_{DSS} is known as _____
a) drain to source current
b) drain to source current with gate shorted
c) drain to source current with gate open
d) none of the above
- 9) What is the purpose of RC or transformer coupling?
a) To separate bias of one stage from another
b) Increase thermal stability
c) Increase efficiency
d) To block a.c
- 10) The current ratio of I_C/I_E is called _____ and it is usually less than one.
a) Beta
b) Alpha
c) Theta
d) Gamma
- 11) The base of a transistor is _____ doped.
a) heavily
b) moderately
c) lightly
d) none of given
- 12) A transistor is a _____ operated device.
a) power
b) current
c) voltage
d) resistor
- 13) In CE configuration the input V-I characteristics are drawn by taking
a) V_{CE} vs. I_C for constant value of I_E
b) V_{BE} vs. I_E for constant value of V_{CE}
c) V_{BE} vs. I_B for constant value of I_C
d) V_{BE} vs. I_B for constant value of V_{CB}
- 14) The phase difference between the input and output voltages in a common emitter arrangement is _____
a) 90 degrees
b) 100 degrees
c) 180 degrees
d) 270 degrees

Seat No.	
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Set	S
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S.Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024

ELECTRONICS ENGINEERING

Electronic Circuit Analysis and Design (BTN04302)

Day & Date: Friday, 17-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Assume suitable data if necessary.
 - 4) Draw neat and labeled diagrams wherever necessary.

Section – I

Q.2 Attempt any FOUR. **16**

- a) Draw circuit diagram of positive and negative clamper using diode and explain their functioning.
- b) Compare the performance of C, L and LC filters.
- c) Describe BJT application as switch.
- d) Describe Early effect in case of BJT.
- e) Draw collector to base bias circuit for BJT and derive formula of its stability factor.

Q.3 Attempt any TWO. **12**

- a) Draw circuit diagram of capacitor shunt filter connected with full wave rectifier. Derive an expression to determine its ripple factor.
- b) Draw circuit using h-model for BJT for CB, BE and CC configuration and define expression for current gain, voltage gain, output resistance and input resistance.
- c) Design a full wave rectifier with an LC filter to provide 15 V DC at 50 mA with maximum ripple of 3 %. Assume input frequency $f = 50$ Hz.

Section – II

Q.4 Attempt any FOUR. **16**

- a) Compare FET and MOSFET.
- b) Draw basic block diagram showing negative concept. Find expression for finding voltage gain with feedback. What is loop gain?
- c) Describe single stage CE amplifier functioning. What is bandwidth in case of CE amplifier.
- d) Describe thermal runaway in the case of BJT.
- e) Describe procedure to draw DC load line for CE amplifier.

Q.5 Attempt any TWO. **12**

- a) Draw CB, CE and CC transistor configuration and plot their input/output characteristics.
- b) Draw circuit diagram for current-series feedback in transistorized circuit and determine its current gain, voltage gain and input resistance with feedback.
- c) Describe construction and functioning of E-type p-channel MOSFET.

Seat No.	
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Seat No.	
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Set **P**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Signals & Systems (BTN04401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

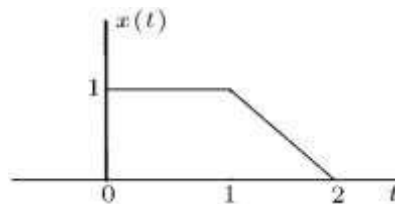
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any FOUR

16

- a) State the Trigonometric Fourier series & derive the expression for computing the coefficients a_0 & a_n of Trigonometric Fourier Series.
- b) Consider the signal $x[n] = \{1, 2, 3, 4\}$ Sketch & label following signals
- ↑
- i) $x[n - 1]$ ii) $x[n + 1]$
 iii) $x[-n]$ iv) $x[n]u[n - 1]$
- c) Obtain and sketch the even and odd parts of the continuous time signal $x(t)$ shown below



- d) Determine whether or not the following signals are periodic or not. If the signal is periodic determine the fundamental period.
- i) $X[n] = u[n]$ ii) $x(t) = e^{j3\pi t}u(t + 1)$
- e) Consider the system whose input output relation is as given below
 $y(t) = x(t - 1)$
 Determine which of the following properties hold & which does not hold by above system. Justify your answers.
- i) Memory less ii) Linear
 iii) Casual iv) Stable

Q.3 Attempt any TWO.

12

- a) Compute convolution sum of $y[n] = x[n] * h[n]$ of the following signals
 $X[n] = u[n]$ and $h[n] = u[n - 1]$
- b) Determine the Trigonometric Fourier series representation for the following signals $x(t)$ periodic with period 2 and
- $$x(t) = \begin{cases} -1 & -1 < t < 0 \\ 1 & 0 \leq t < 1 \end{cases}$$
- c) Consider the LTI systems with following impulse responses
- i) $h[n] = (0.5)^n u[n - 1]$
 ii) $h(t) = e^{-3t} u(t - 1)$
- Determine whether each of the above system is causal and or stable.
 Justify your answers

Section – II

Q.4 Attempt any FOUR**16**

- a) Explain how to represent periodic signal using Fourier transform.
- b) Write short note on Aliasing: The effect of under sampling.
- c) Obtain the Fourier transform of $x(t) = e^{-2t}u(t)$, $a > 0$
- d) Explain in brief how to reconstruct a signal from its samples using Interpolation.
- e) Consider an LTI system with the system function

$$H(s) = \frac{s - 1}{(s + 1)(s - 2)}$$

Obtain the impulse response $h(t)$ of the system if the system is causal, state the region of convergence of the system.

Q.5 Solve any TWO of the Following.**12**

- a) State and explain the sampling theorem for continuous time signals.
- b) The analog signal given below is sampled at 600 samples per second
 $x(t) = 2 \sin(480\pi t) + 3 \sin(720\pi t)$
 Calculate
 - i) Nyquist sampling rate
 - ii) Folding frequency
- c) Compute Fourier transform of following signals. Sketch magnitude transforms.
 - i) $x_1(t) = e^{-2(t-1)} u(t - 1)$
 - ii) $x(t) = \delta(t - 1)$

Seat No.	
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Set

Q

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING**Signals & Systems (BTN04401)**

Day & Date: Wednesday, 22-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.

3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct option.**14**

- 1) Fourier transform of $\frac{dx(t)}{dt}$ is _____
 - a) $x(j\omega)$
 - b) $\frac{1}{j\omega} \times (j\omega)$
 - c) $j\omega \times (j\omega)$
 - d) $e^{j\omega} \times (j\omega)$
- 2) The sinc function can be defined as $\text{SINC}(x) =$ _____
 - a) $\frac{\sin x}{x}$
 - b) $\frac{\sin \pi x}{x}$
 - c) $\frac{\sin \pi x}{\pi x}$
 - d) $\text{SINC}\left(\frac{\sin x}{x}\right)$
- 3) Z - transform converts convolution of time signals to _____
 - a) Addition
 - b) Subtraction
 - c) Multiplication
 - d) Division
- 4) Fourier transform of unity is _____
 - a) $\delta(\omega)$
 - b) $\pi \delta(\omega)$
 - c) $2\pi \delta(\omega)$
 - d) Unit step signal
- 5) If $x(t)$ signal is multiplied with train of impulses, the process is _____
 - a) Convolution
 - b) Z transform
 - c) Laplace transform
 - d) Sampling
- 6) If sampling frequency is 500 Hz, then for proper recovery of signal the signal frequency should be _____
 - a) ≥ 2000 Hz
 - b) ≥ 1000 Hz
 - c) ≥ 500 Hz
 - d) ≤ 500 Hz
- 7) Which of the following is the method used for reconstruction of signal from its samples?
 - a) Zero order hold
 - b) Linear interpolation
 - c) Both a) and b)
 - d) None of these
- 8) The system with input output relation $y(t) = x(t) + x(t - 100)$ is _____
 - a) Linear
 - b) Casual
 - c) Linear and casual
 - d) None

- Page 6 of 16

Seat No.	
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Set **Q**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Signals & Systems (BTN04401)

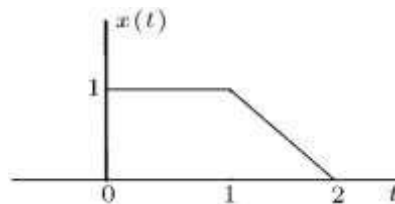
Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I**Q.2 Attempt any FOUR****16**

- a) State the Trigonometric Fourier series & derive the expression for computing the coefficients a_0 & a_n of Trigonometric Fourier Series.
- b) Consider the signal $x[n] = \{1, 2, 3, 4\}$ Sketch & label following signals
- ↑
- i) $x[n - 1]$ ii) $x[n + 1]$
 iii) $x[-n]$ iv) $x[n]u[n - 1]$
- c) Obtain and sketch the even and odd parts of the continuous time signal $x(t)$ shown below



- d) Determine whether or not the following signals are periodic or not. If the signal is periodic determine the fundamental period.
- i) $X[n] = u[n]$ ii) $x(t) = e^{j3\pi t}u(t + 1)$
- e) Consider the system whose input output relation is as given below
 $y(t) = x(t - 1)$
 Determine which of the following properties hold & which does not hold by above system. Justify your answers.
- i) Memory less ii) Linear
 iii) Casual iv) Stable

Q.3 Attempt any TWO.**12**

- a) Compute convolution sum of $y[n] = x[n] * h[n]$ of the following signals
 $X[n] = u[n]$ and $h[n] = u[n - 1]$
- b) Determine the Trigonometric Fourier series representation for the following signals $x(t)$ periodic with period 2 and
- $$x(t) = \begin{cases} -1 & -1 < t < 0 \\ 1 & 0 \leq t < 1 \end{cases}$$
- c) Consider the LTI systems with following impulse responses
- i) $h[n] = (0.5)^n u[n - 1]$
 ii) $h(t) = e^{-3t} u(t - 1)$

Determine whether each of the above system is causal and or stable.
 Justify your answers

Section – II

Q.4 Attempt any FOUR**16**

- a) Explain how to represent periodic signal using Fourier transform.
- b) Write short note on Aliasing: The effect of under sampling.
- c) Obtain the Fourier transform of $x(t) = e^{-2t}u(t)$, $a > 0$
- d) Explain in brief how to reconstruct a signal from its samples using Interpolation.
- e) Consider an LTI system with the system function

$$H(s) = \frac{s - 1}{(s + 1)(s - 2)}$$

Obtain the impulse response $h(t)$ of the system if the system is causal, state the region of convergence of the system.

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- a) State and explain the sampling theorem for continuous time signals.
- b) The analog signal given below is sampled at 600 samples per second
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 - i) Nyquist sampling rate
 - ii) Folding frequency
- c) Compute Fourier transform of following signals. Sketch magnitude transforms.
 - i) $x_1(t) = e^{-2(t-1)} u(t - 1)$
 - ii) $x(t) = \delta(t - 1)$

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Signals & Systems (BTN04401)

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Marks:14

14

- 1) Fourier transform of unity is _____
a) $\delta(\omega)$
b) $\pi \delta(\omega)$
c) $2\pi \delta(\omega)$
d) Unit step signal
- 2) If $x(t)$ signal is multiplied with train of impulses, the process is _____
a) Convolution
b) Z transform
c) Laplace transform
d) Sampling
- 3) If sampling frequency is 500 Hz, then for proper recovery of signal the signal frequency should be _____
a) ≥ 2000 Hz
b) ≥ 1000 Hz
c) ≥ 500 Hz
d) ≤ 500 Hz
- 4) Which of the following is the method used for reconstruction of signal from its samples?
a) Zero order hold
b) Linear interpolation
c) Both a) and b)
d) None of these
- 5) The system with input output relation $y(t) = x(t) + x(t - 100)$ is _____
a) Linear
b) Casual
c) Linear and casual
d) None
- 6) The range of n for which the signal $u(n + 1) - 2u(n - 2)$ exists is _____
a) -2 to 2
b) -1 to 1
c) -1 to ∞
d) -3 to 2
- 7) $x(t)$ is even symmetric signal and $y(t)$ is odd symmetric signal then $z(t) = x(t)y(t)$ will be _____
a) Even symmetric
b) Odd Symmetric
c) Neither Even nor Odd
d) Zero
- 8) A system is having impulse response $h(t)$ will be BIBO stable if _____
a) $\int_{-\infty}^{\infty} |h(t)| > \infty$
b) $\int_{-\infty}^{\infty} |h(t)| < \infty$
c) $\int_{-\infty}^{\infty} |h(t)| = 0$
d) $\int_{-\infty}^{\infty} |h(t)| = 1$

- 9) A discrete time LTI system is casual if _____
- a) $h[n] = 0$ for $n < 0$ b) $h[n] = 0$ for $n = 0$
 c) $h[n] = 0$ for $n \neq 0$ d) $h[n] = 0$ for $n > 0$
- 10) The fundamental period T of the continuous time signal je^{j2t} is _____
- a) π sec b) 0.4π sec
 c) 0.3π sec d) 0.5π sec
- 11) $m(t)$ is an even function, then its Fourier representation has _____
- a) $a_0 = 0$ b) $a_n = 0$
 c) $b_n = 0$ d) $a_n = b_n$
- 12) Fourier transform of $\frac{dx(t)}{dt}$ is _____
- a) $x(j\omega)$ b) $\frac{1}{j\omega} \times (j\omega)$
 c) $j\omega \times (j\omega)$ d) $e^{j\omega} \times (j\omega)$
- 13) The sinc function can be defined as $\text{SINC}(x) =$ _____
- a) $\frac{\sin x}{x}$ b) $\frac{\sin \pi x}{x}$
 c) $\frac{\sin \pi x}{\pi x}$ d) $\text{SINC}\left(\frac{\sin x}{x}\right)$
- 14) Z - transform converts convolution of time signals to _____
- a) Addition b) Subtraction
 c) Multiplication d) Division

Seat No.	
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Set **R**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Signals & Systems (BTN04401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

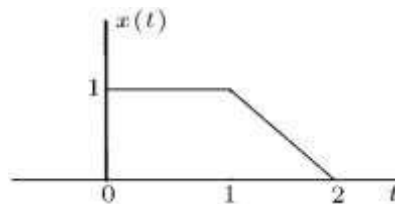
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any FOUR

16

- a) State the Trigonometric Fourier series & derive the expression for computing the coefficients a_0 & a_n of Trigonometric Fourier Series.
- b) Consider the signal $x[n] = \{1, 2, 3, 4\}$ Sketch & label following signals
- ↑
- i) $x[n - 1]$ ii) $x[n + 1]$
 iii) $x[-n]$ iv) $x[n]u[n - 1]$
- c) Obtain and sketch the even and odd parts of the continuous time signal $x(t)$ shown below



- d) Determine whether or not the following signals are periodic or not. If the signal is periodic determine the fundamental period.
- i) $X[n] = u[n]$ ii) $x(t) = e^{j3\pi t}u(t + 1)$
- e) Consider the system whose input output relation is as given below
 $y(t) = x(t - 1)$
 Determine which of the following properties hold & which does not hold by above system. Justify your answers.
- i) Memory less ii) Linear
 iii) Casual iv) Stable

Q.3 Attempt any TWO.

12

- a) Compute convolution sum of $y[n] = x[n] * h[n]$ of the following signals
 $X[n] = u[n]$ and $h[n] = u[n - 1]$
- b) Determine the Trigonometric Fourier series representation for the following signals $x(t)$ periodic with period 2 and
- $$x(t) = \begin{cases} -1 & -1 < t < 0 \\ 1 & 0 \leq t < 1 \end{cases}$$
- c) Consider the LTI systems with following impulse responses
- i) $h[n] = (0.5)^n u[n - 1]$
 ii) $h(t) = e^{-3t} u(t - 1)$

Determine whether each of the above system is causal and or stable.
 Justify your answers

Section – II

Q.4 Attempt any FOUR**16**

- a) Explain how to represent periodic signal using Fourier transform.
- b) Write short note on Aliasing: The effect of under sampling.
- c) Obtain the Fourier transform of $x(t) = e^{-2t}u(t)$, $a > 0$
- d) Explain in brief how to reconstruct a signal from its samples using Interpolation.
- e) Consider an LTI system with the system function

$$H(s) = \frac{s - 1}{(s + 1)(s - 2)}$$

Obtain the impulse response $h(t)$ of the system if the system is causal, state the region of convergence of the system.

Q.5 Solve any TWO of the Following.**12**

- a) State and explain the sampling theorem for continuous time signals.
- b) The analog signal given below is sampled at 600 samples per second
 $x(t) = 2 \sin(480\pi t) + 3 \sin(720\pi t)$
 Calculate
 - i) Nyquist sampling rate
 - ii) Folding frequency
- c) Compute Fourier transform of following signals. Sketch magnitude transforms.
 - i) $x_1(t) = e^{-2(t-1)} u(t - 1)$
 - ii) $x(t) = \delta(t - 1)$

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Signals & Systems (BTN04401)

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Marks:14

14

- 1) The fundamental period T of the continuous time signal je^{j2t} is _____
a) π sec
b) 0.4π sec
c) 0.3π sec
d) 0.5π sec
- 2) $m(t)$ is an even function, then its Fourier representation has _____
a) $a_0 = 0$
b) $a_n = 0$
c) $b_n = 0$
d) $a_n = b_n$
- 3) Fourier transform of $\frac{dx(t)}{dt}$ is _____
a) $x(j\omega)$
b) $\frac{1}{j\omega} \times (j\omega)$
c) $j\omega \times (j\omega)$
d) $e^{j\omega} \times (j\omega)$
- 4) The sinc function can be defined as $\text{SINC}(x) =$ _____
a) $\frac{\sin x}{x}$
b) $\frac{\sin \pi x}{x}$
c) $\frac{\sin \pi x}{\pi x}$
d) $\text{SINC}\left(\frac{\sin x}{x}\right)$
- 5) Z - transform converts convolution of time signals to _____
a) Addition
b) Subtraction
c) Multiplication
d) Division
- 6) Fourier transform of unity is _____
a) $\delta(\omega)$
b) $\pi \delta(\omega)$
c) $2\pi \delta(\omega)$
d) Unit step signal
- 7) If $x(t)$ signal is multiplied with train of impulses, the process is _____
a) Convolution
b) Z transform
c) Laplace transform
d) Sampling
- 8) If sampling frequency is 500 Hz, then for proper recovery of signal the signal frequency should be _____
a) ≥ 2000 Hz
b) ≥ 1000 Hz
c) ≥ 500 Hz
d) ≤ 500 Hz

- 9) Which of the following is the method used for reconstruction of signal from its samples?

a) Zero order hold b) Linear interpolation
c) Both a) and b) d) None of these
- 10) The system with input output relation $y(t) = x(t) + x(t - 100)$ is _____

a) Linear b) Casual
c) Linear and casual d) None
- 11) The range of n for which the signal $u(n + 1) - 2u(n - 2)$ exists is _____

a) -2 to 2 b) -1 to 1
c) -1 to ∞ d) -3 to 2
- 12) $x(t)$ is even symmetric signal and $y(t)$ is odd symmetric signal then $z(t) = x(t)y(t)$ will be _____

a) Even symmetric b) Odd Symmetric
c) Neither Even nor Odd d) Zero
- 13) A system is having impulse response $h(t)$ will be BIBO stable if _____

a) $\int_{-\infty}^{\infty} |h(t)| > \infty$ b) $\int_{-\infty}^{\infty} |h(t)| < \infty$
c) $\int_{-\infty}^{\infty} |h(t)| = 0$ d) $\int_{-\infty}^{\infty} |h(t)| = 1$
- 14) A discrete time LTI system is casual if _____

a) $h[n] = 0$ for $n < 0$ b) $h[n] = 0$ for $n = 0$
c) $h[n] = 0$ for $n \neq 0$ d) $h[n] = 0$ for $n > 0$

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Signals & Systems (BTN04401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

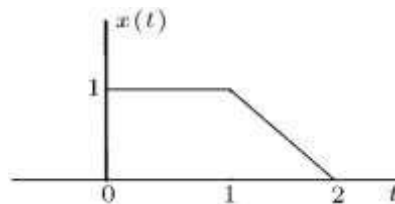
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any FOUR

16

- a) State the Trigonometric Fourier series & derive the expression for computing the coefficients a_0 & a_n of Trigonometric Fourier Series.
- b) Consider the signal $x[n] = \{1, 2, 3, 4\}$ Sketch & label following signals
- ↑
- i) $x[n - 1]$ ii) $x[n + 1]$
 iii) $x[-n]$ iv) $x[n]u[n - 1]$
- c) Obtain and sketch the even and odd parts of the continuous time signal $x(t)$ shown below



- d) Determine whether or not the following signals are periodic or not. If the signal is periodic determine the fundamental period.
- i) $X[n] = u[n]$ ii) $x(t) = e^{j3\pi t}u(t + 1)$
- e) Consider the system whose input output relation is as given below
 $y(t) = x(t - 1)$
 Determine which of the following properties hold & which does not hold by above system. Justify your answers.
- i) Memory less ii) Linear
 iii) Casual iv) Stable

Q.3 Attempt any TWO.

12

- a) Compute convolution sum of $y[n] = x[n] * h[n]$ of the following signals
 $X[n] = u[n]$ and $h[n] = u[n - 1]$
- b) Determine the Trigonometric Fourier series representation for the following signals $x(t)$ periodic with period 2 and
- $$x(t) = \begin{cases} -1 & -1 < t < 0 \\ 1 & 0 \leq t < 1 \end{cases}$$
- c) Consider the LTI systems with following impulse responses
- i) $h[n] = (0.5)^n u[n - 1]$
 ii) $h(t) = e^{-3t} u(t - 1)$

Determine whether each of the above system is causal and or stable.
 Justify your answers

Section – II

Q.4 Attempt any FOUR**16**

- a) Explain how to represent periodic signal using Fourier transform.
- b) Write short note on Aliasing: The effect of under sampling.
- c) Obtain the Fourier transform of $x(t) = e^{-2t}u(t)$, $a > 0$
- d) Explain in brief how to reconstruct a signal from its samples using Interpolation.
- e) Consider an LTI system with the system function

$$H(s) = \frac{s - 1}{(s + 1)(s - 2)}$$

Obtain the impulse response $h(t)$ of the system if the system is causal, state the region of convergence of the system.

Q.5 Solve any TWO of the Following.**12**

- a) State and explain the sampling theorem for continuous time signals.
- b) The analog signal given below is sampled at 600 samples per second
 $x(t) = 2 \sin(480\pi t) + 3 \sin(720\pi t)$
 Calculate
 - i) Nyquist sampling rate
 - ii) Folding frequency
- c) Compute Fourier transform of following signals. Sketch magnitude transforms.
 - i) $x_1(t) = e^{-2(t-1)} u(t - 1)$
 - ii) $x(t) = \delta(t - 1)$

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Control Systems (BTN04402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 Each question carries one mark.
 2) Answer MCQ/Objective type question on page No. 3 only. Don't forget to mention, Q. P. set (P/Q/R/S) on Top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.

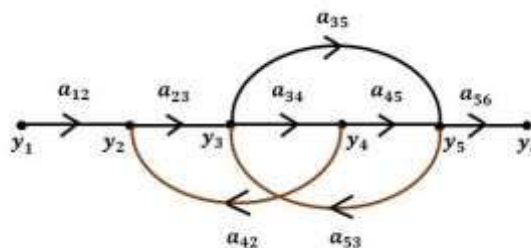
MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Tick mark the correct answer:**14**

- 1) Block diagram can be used to represent _____.
 a) Only linear system
 b) Only nonlinear system
 c) both linear & nonlinear system
 d) Time variant as well as time in-variant systems
- 2) The path from source node to sink node in SFG is called as _____.
 a) Forward loops
 b) Forward path
 c) Forward path gain
 d) None of these
- 3) A synchro pair consists of a _____ and a _____.
 a) Synchro transmitter & synchro control transformer
 b) Transmitter & receiver
 c) Transformer & detector
 d) Transducer & receiver
- 4) One of the basic requirements of a servomotor is that it must produce high torque at all _____.
 a) Loads
 b) Frequencies
 c) Speeds
 d) Voltages
- 5) The _____ number of forward paths and number of loops _____ are present in given SFG.



- a) 2, 2
 b) 2, 3
 c) 1, 2
 d) 1, 3

- 6) A control system having damping factor between 0 and 1, will give _____.
a) Critically damped response b) Underdamped response
c) Undamped response d) No response
- 7) If the system is specified by open loop transfer function $G(s)H(s)$ = how many root loci proceed to end at infinity?
a) 2 b) 3
c) 5 d) 6
- 8) What is the type of the closed loop system for the plant transfer function $G(S)=$
a) 2 b) 1
c) 3 d) 0
- 9) The compensator required to improved the transient response of system is _____.
a) Lead b) Lag
c) Lag-Lead d) None of these
- 10) Consider the loop transfer function In the root locus diagram the centroid will be located at:
a) -4 b) -1
c) -2 d) -3
- 11) At the phase crossover frequency $|G(j\omega)H(j\omega)| =$
a) 0° b) 180°
c) -90° d) -180°
- 12) If the system has nonrepeated pole on the $j\infty$ axis, the system is
a) Stable b) Unstable
c) Marginally stable d) Conditionally unstable
- 13) At which frequency does the magnitude of the system becomes zero dB?
a) Resonant frequency b) Cut-off frequency
c) Gain crossover frequency d) Phase crossover frequency
- 14) Bandwidth is reduced when compensator used is
a) Lead b) Lag
c) Lag-Lead d) None of these

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING**Control Systems (BTN04402)**

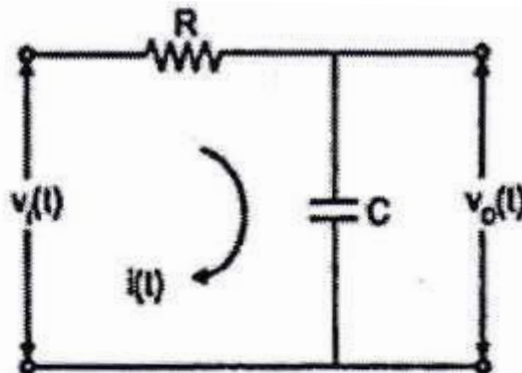
Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figure to the right indicate full marks.
3) Assume suitable data if required.

Section – I**Q.2 Solve any Four of the Following.****16**

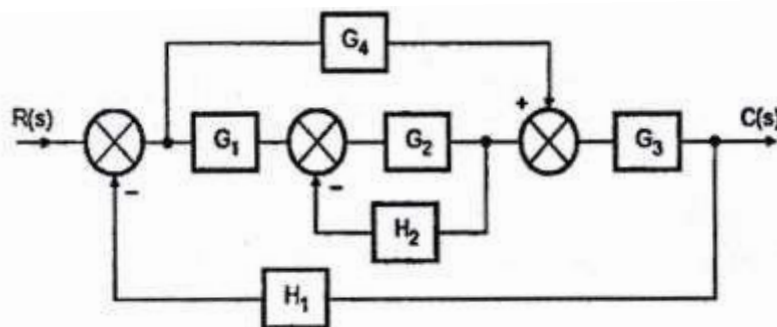
- Analyze Type 0, Type 1 & Type 2 system for step input.
- A system has following transfer function Determine its unit impulse, step response with zero initial conditions. Sketch responses.
- Describe construction and working of permanent magnet stepper motor.
- Define transfer function. Find out transfer function of above network.



- Define closed loop control system. Prove that =

Q.3 Solve the Following (Any Two)**12**

- Derive the expressions for first order system for unit step input.
- With suitable diagram how synchro can be used as an error detector?
- Obtain transfer function for the given system by using block diagram reduction technique.



Section – II

Q.4 Attempt the Following (Any Four)**16**

- a) Explain the following rules for construction of root locus with example
 - i) Angle of asymptotes
 - ii) Breakway point (with general predictions)
- b) Consider characteristics equation $S^5 + S^4 + 2s^3 + 2s^2 + 3s + 5 = 0$. Determine stability using Routh's criterion.
- c) What do you mean by proportional control? Elaborate effect of proportional controller on the performance of system.
- d) Explain nature of Bode plot for
 - i) Simple gain 'K'
 - ii) Simple poles (first order factor)
- e) What do you mean by a polar plot? Draw polar plot for Type one system.

Q.5 Attempt the Following (Any Two)**12**

- a) A feedback system has $G(s)H(s) = \dots$. Sketch the Bode plot and comment on stability.
- b) For unit feedback system $G(s) = \dots$ sketch nature root locus and comment on stability.
- c) What is compensator? Derive transfer function of lead compensator and also explain its polar plot.

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Control Systems (BTN04402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 Each question carries one mark.
 2) Answer MCQ/Objective type question on page No. 3 only. Don't forgot to mention, Q. P. set (P/Q/R/S) on Top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Tick mark the correct answer:**14**

- 1) What is the type of the closed loop system for the plant transfer function $G(S)=$
 - a) 2
 - b) 1
 - c) 3
 - d) 0
- 2) The compensator required to improved the transient response of system is _____.
 - a) Lead
 - b) Lag
 - c) Lag-Lead
 - d) None of these
- 3) Consider the loop transfer function In the root locus diagram the centroid will be located at:
 - a) -4
 - b) -1
 - c) -2
 - d) -3
- 4) At the phase crossover frequency $|G(j\omega)H(j\omega)| =$
 - a) 0°
 - b) 180°
 - c) -90°
 - d) -180°
- 5) If the system has nonrepeated pole on the $j\infty$ axis, the system is
 - a) Stable
 - b) Unstable
 - c) Marginally stable
 - d) Conditionally unstable
- 6) At which frequency does the magnitude of the system becomes zero dB?
 - a) Resonant frequency
 - b) Cut-off frequency
 - c) Gain crossover frequency
 - d) Phase crossover frequency
- 7) Bandwidth is reduced when compensator used is
 - a) Lead
 - b) Lag
 - c) Lag-Lead
 - d) None of these
- 8) Block diagram can be used to represent _____.
 - a) Only linear system
 - b) Only nonlinear system
 - c) both linear & nonlinear system
 - d) Time variant as well as time in-variant systems

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- Page 6 of 16

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Control Systems (BTN04402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

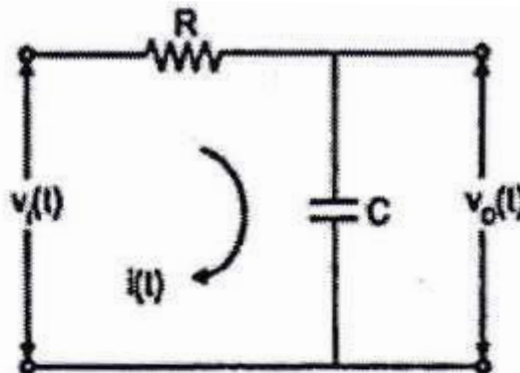
- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicate full marks.
 3) Assume suitable data if required.

Section – I

Q.2 Solve any Four of the Following.

16

- Analyze Type 0, Type 1 & Type 2 system for step input.
- A system has following transfer function Determine its unit impulse, step response with zero initial conditions. Sketch responses.
- Describe construction and working of permanent magnet stepper motor.
- Define transfer function. Find out transfer function of above network.

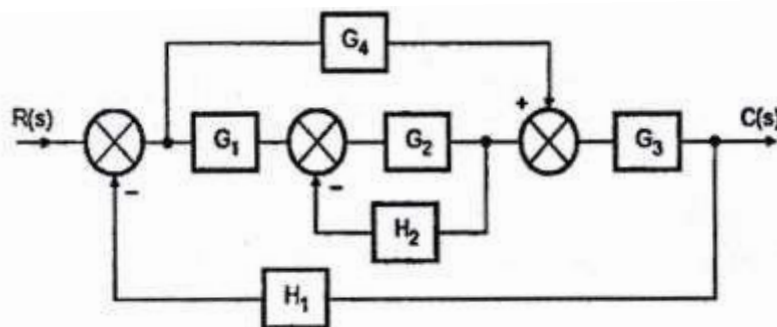


- Define closed loop control system. Prove that =

Q.3 Solve the Following (Any Two)

12

- Derive the expressions for first order system for unit step input.
- With suitable diagram how synchro can be used as an error detector?
- Obtain transfer function for the given system by using block diagram reduction technique.



Section – II

Q.4 Attempt the Following (Any Four)**16**

- a) Explain the following rules for construction of root locus with example
 - i) Angle of asymptotes
 - ii) Breakway point (with general predictions)
- b) Consider characteristics equation $S^5 + S^4 + 2s^3 + 2s^2 + 3s + 5 = 0$. Determine stability using Routh's criterion.
- c) What do you mean by proportional control? Elaborate effect of proportional controller on the performance of system.
- d) Explain nature of Bode plot for
 - i) Simple gain 'K'
 - ii) Simple poles (first order factor)
- e) What do you mean by a polar plot? Draw polar plot for Type one system.

Q.5 Attempt the Following (Any Two)**12**

- a) A feedback system has $G(s)H(s) = \dots$. Sketch the Bode plot and comment on stability.
- b) For unit feedback system $G(s) = \dots$ sketch nature root locus and comment on stability.
- c) What is compensator? Derive transfer function of lead compensator and also explain its polar plot.

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Control Systems (BTN04402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 Each question carries one mark.
 2) Answer MCQ/Objective type question on page No. 3 only. Don't forget to mention, Q. P. set (P/Q/R/S) on Top of page.
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MCQ/Objective Type Questions

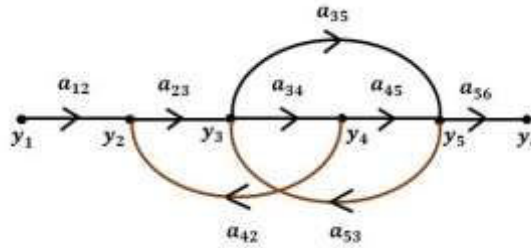
Duration: 30 Minutes

Marks: 14

Q.1 Tick mark the correct answer:

14

- 1) At the phase crossover frequency $|G(j\omega)H(j\omega)| =$
 - a) 0°
 - b) 180°
 - c) -90°
 - d) -180°
- 2) If the system has nonrepeated pole on the $j\infty$ axis, the system is
 - a) Stable
 - b) Unstable
 - c) Marginally stable
 - d) Conditionally unstable
- 3) At which frequency does the magnitude of the system becomes zero dB?
 - a) Resonant frequency
 - b) Cut-off frequency
 - c) Gain crossover frequency
 - d) Phase crossover frequency
- 4) Bandwidth is reduced when compensator used is
 - a) Lead
 - b) Lag
 - c) Lag-Lead
 - d) None of these
- 5) Block diagram can be used to represent _____.
 - a) Only linear system
 - b) Only nonlinear system
 - c) both linear & nonlinear system
 - d) Time variant as well as time in-variant systems
- 6) The path from source node to sink node in SFG is called as _____.
 - a) Forward loops
 - b) Forward path
 - c) Forward path gain
 - d) None of these
- 7) A synchro pair consists of a _____ and a _____.
 - a) Synchro transmitter & synchro control transformer
 - b) Transmitter & receiver
 - c) Transformer & detector
 - d) Transducer & receiver
- 8) One of the basic requirements of a servomotor is that it must produce high torque at all _____.
 - a) Loads
 - b) Frequencies
 - c) Speeds
 - d) Voltages



Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Control Systems (BTN04402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

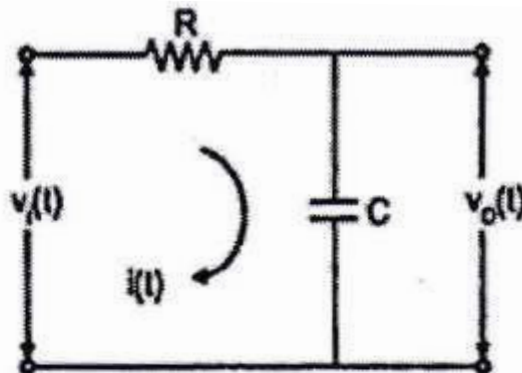
- Instructions:** 1) All questions are compulsory.
 2) Figure to the right indicate full marks.
 3) Assume suitable data if required.

Section – I

Q.2 Solve any Four of the Following.

16

- Analyze Type 0, Type 1 & Type 2 system for step input.
- A system has following transfer function Determine its unit impulse, step response with zero initial conditions. Sketch responses.
- Describe construction and working of permanent magnet stepper motor.
- Define transfer function. Find out transfer function of above network.

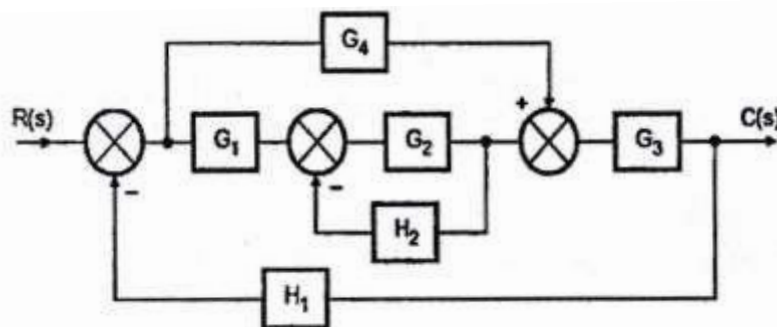


- Define closed loop control system. Prove that =

Q.3 Solve the Following (Any Two)

12

- Derive the expressions for first order system for unit step input.
- With suitable diagram how synchro can be used as an error detector?
- Obtain transfer function for the given system by using block diagram reduction technique.



Section – II

Q.4 Attempt the Following (Any Four)**16**

- a) Explain the following rules for construction of root locus with example
 - i) Angle of asymptotes
 - ii) Breakway point (with general predictions)
- b) Consider characteristics equation $S^5 + S^4 + 2s^3 + 2s^2 + 3s + 5 = 0$. Determine stability using Routh's criterion.
- c) What do you mean by proportional control? Elaborate effect of proportional controller on the performance of system.
- d) Explain nature of Bode plot for
 - i) Simple gain 'K'
 - ii) Simple poles (first order factor)
- e) What do you mean by a polar plot? Draw polar plot for Type one system.

Q.5 Attempt the Following (Any Two)**12**

- a) A feedback system has $G(s)H(s) = \dots$. Sketch the Bode plot and comment on stability.
- b) For unit feedback system $G(s) = \dots$ sketch nature root locus and comment on stability.
- c) What is compensator? Derive transfer function of lead compensator and also explain its polar plot.

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Control Systems (BTN04402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 Each question carries one mark.
 2) Answer MCQ/Objective type question on page No. 3 only. Don't forget to mention, Q. P. set (P/Q/R/S) on Top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Tick mark the correct answer:**14**

- 1) A control system having damping factor between 0 and 1, will give _____.
 a) Critically damped response b) Underdamped response
 c) Undamped response d) No response
- 2) If the system is specified by open loop transfer function $G(s)H(s)$ = how many root loci proceed to end at infinity?
 a) 2 b) 3
 c) 5 d) 6
- 3) What is the type of the closed loop system for the plant transfer function $G(S)=$
 a) 2 b) 1
 c) 3 d) 0
- 4) The compensator required to improved the transient response of system is _____.
 a) Lead b) Lag
 c) Lag-Lead d) None of these
- 5) Consider the loop transfer function In the root locus diagram the centroid will be located at:
 a) -4 b) -1
 c) -2 d) -3
- 6) At the phase crossover frequency $|G(j\omega)H(j\omega)| =$
 a) 0° b) 180°
 c) -90° d) -180°
- 7) If the system has nonrepeated pole on the $j\infty$ axis, the system is
 a) Stable b) Unstable
 c) Marginally stable d) Conditionally unstable
- 8) At which frequency does the magnitude of the system becomes zero dB?
 a) Resonant frequency b) Cut-off frequency
 c) Gain crossover frequency d) Phase crossover frequency

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- Page 14 of 16

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING**Control Systems (BTN04402)**

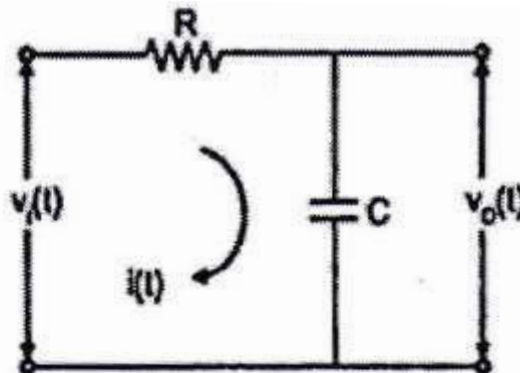
Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figure to the right indicate full marks.
3) Assume suitable data if required.

Section – I**Q.2 Solve any Four of the Following.****16**

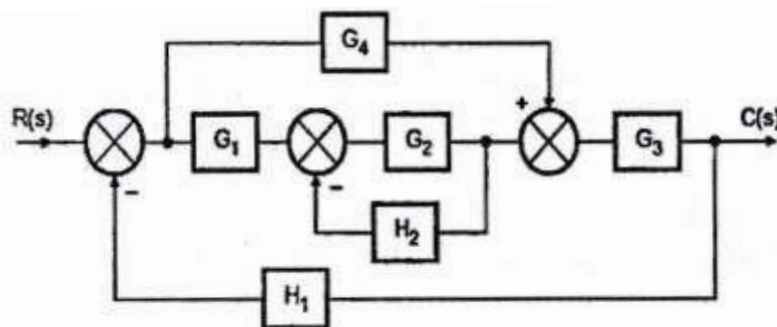
- Analyze Type 0, Type 1 & Type 2 system for step input.
- A system has following transfer function Determine its unit impulse, step response with zero initial conditions. Sketch responses.
- Describe construction and working of permanent magnet stepper motor.
- Define transfer function. Find out transfer function of above network.



- Define closed loop control system. Prove that =

Q.3 Solve the Following (Any Two)**12**

- Derive the expressions for first order system for unit step input.
- With suitable diagram how synchro can be used as an error detector?
- Obtain transfer function for the given system by using block diagram reduction technique.



Section – II

Q.4 Attempt the Following (Any Four)**16**

- a) Explain the following rules for construction of root locus with example
 - i) Angle of asymptotes
 - ii) Breakway point (with general predictions)
- b) Consider characteristics equation $S^5 + S^4 + 2s^3 + 2s^2 + 3s + 5 = 0$. Determine stability using Routh's criterion.
- c) What do you mean by proportional control? Elaborate effect of proportional controller on the performance of system.
- d) Explain nature of Bode plot for
 - i) Simple gain 'K'
 - ii) Simple poles (first order factor)
- e) What do you mean by a polar plot? Draw polar plot for Type one system.

Q.5 Attempt the Following (Any Two)**12**

- a) A feedback system has $G(s)H(s) = \dots$. Sketch the Bode plot and comment on stability.
- b) For unit feedback system $G(s) = \dots$ sketch nature root locus and comment on stability.
- c) What is compensator? Derive transfer function of lead compensator and also explain its polar plot.

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Data Structures and Algorithms (BTN04405)

Day & Date: Sunday, 26-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following MCQs.

14

- 1) A hash collision resolution technique that uses linked list data structure is _____.
a) Open Addressing b) Closed Addressing
c) Linear Probing d) Quadratic Probing
- 2) The number of edges from the root to the node is called of the tree.
a) Height b) Depth
c) Length d) None of the mentioned
- 3) An algorithm that calls itself directly or indirectly is known as _____.
a) stack b) recursion
c) graph d) traversal algorithm
- 4) The operation of processing each element in the data structure is known as _____.
a) sorting b) merging
c) inserting d) traversal
- 5) A Binary Tree can have _____.
a) Can have 2 children b) Can have 1 children
c) Can have 0 children d) All of the above
- 6) In a graph, if an edge $e=[u,v]$, Then u and v are called _____.
a) Endpoints of e b) Adjacent nodes
c) Neighbors d) All of the above
- 7) In stack terminology, what is the term used to describe the removal of an element from the stack?
a) Pop b) Push
c) Peek d) Insert
- 8) What is the definition of a queue?
a) A data structure that follows the LIFO (Last-In, First-Out) principle.
b) A data structure that follows the FIFO (First-In, First-Out) principle.
c) A data structure that allows random access to its elements.
d) A data structure that combines characteristics of both stacks and lists.

- 9) Which data structure is suitable for implementing a priority queue efficiently?
- a) Array
 - b) Linked list
 - c) Heap
 - d) Stack
- 10) Which type of linked list allows traversal in both forward and backward directions?
- a) Singly linked list
 - b) Doubly linked list
 - c) Circular linked list
 - d) Static linked list
- 11) What is recursion in the context of programming?
- a) A loop that repeats a block of code a specific number of times.
 - b) A function that calls itself to solve a problem by breaking it down into smaller subproblems.
 - c) A programming technique used to implement conditional statements.
 - d) A method to allocate memory dynamically during program execution.
- 12) Which of the following is NOT a type of graph?
- a) Directed graph
 - b) Undirected graph
 - c) Weighted graph
 - d) Circular graph
- 13) Which of the following is a graph traversal method that explores all the vertices at the current level before moving to the next level?
- a) Depth-first search (DFS)
 - b) Breadth-first search (BFS)
 - c) Dijkstra's algorithm
 - d) Prim's algorithm
- 14) Which of the following sorting algorithms repeatedly compares adjacent elements and swaps them if they are in the wrong order?
- a) Insertion sort
 - b) Selection sort
 - c) Bubble sort
 - d) Merge sort

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Data Structures and Algorithms (BTN04405)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I**Q.2 Attempt any four:****16**

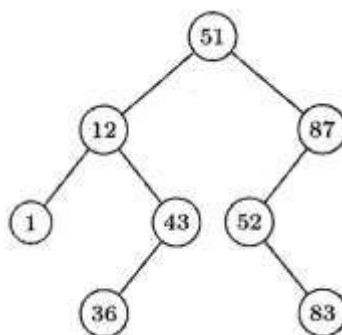
- Implement the C function for operations on the stack (Push, Pop, Peek, Traverse)
- What is Queue data structure? Describe all its operations.
- Convert the following infix expression into a postfix expression.
 - $(A + B) * C \setminus D$
 - $[((A + B) * (C - D)) + (F - G)]$
- Which are the advantages of Doubly linked list over singly linked list? Describe deletion operation of Doubly linked list
- With the help of diagram describe the insertion and deletion operation on circular queue.

Q.3 Attempt any Two:**12**

- What is the application of stack. Explain any two in details with example.
- Write a program to implement circular queue. Implement all operations.
- What is recursion? What are its types? Explain how recursion works.

Section – II**Q.4 Attempt any Four:****16**

- Explain the terms with proper example and diagram:
 - Hashing
 - Hashing Table
 - Hashing Function
- Write the algorithms/functions for Tree Traversals and for the given tree illustrate the traversals with proper diagram
 - in-order traversal
 - pre-order traversal
 - post-order traversal



- c) Describe bubble sort with help of suitable example.
- d) List and explain different types of graphs.
- e) Create a binary tree from the given traversing sequences. Show all steps.
In-order-ACD E I N O T U
Pre-order-E D C A U T I O N

Q.5 Attempt any Two:**12**

- a) Write a program to implement Quick Sort Algorithm. Given below is an array of 10 numbers apply the Quick Sort Algorithm and show various stages with a suitable diagram.
Array: 12, 55, 9, 21, 87, 39, 61, 10, 76, 50
- b) Write a program to implement both linear search and binary search. Explain with proper examples and diagram how it works.
- c) What is a graph? Explain with an example of how a graph is represented in memory. Discuss the applications of graphs.

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Data Structures and Algorithms (BTN04405)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following MCQs.

14

- 1) What is the definition of a queue?
 - a) A data structure that follows the LIFO (Last-In, First-Out) principle.
 - b) A data structure that follows the FIFO (First-In, First-Out) principle.
 - c) A data structure that allows random access to its elements.
 - d) A data structure that combines characteristics of both stacks and lists.
- 2) Which data structure is suitable for implementing a priority queue efficiently?
 - a) Array
 - b) Linked list
 - c) Heap
 - d) Stack
- 3) Which type of linked list allows traversal in both forward and backward directions?
 - a) Singly linked list
 - b) Doubly linked list
 - c) Circular linked list
 - d) Static linked list
- 4) What is recursion in the context of programming?
 - a) A loop that repeats a block of code a specific number of times.
 - b) A function that calls itself to solve a problem by breaking it down into smaller subproblems.
 - c) A programming technique used to implement conditional statements.
 - d) A method to allocate memory dynamically during program execution.
- 5) Which of the following is NOT a type of graph?
 - a) Directed graph
 - b) Undirected graph
 - c) Weighted graph
 - d) Circular graph
- 6) Which of the following is a graph traversal method that explores all the vertices at the current level before moving to the next level?
 - a) Depth-first search (DFS)
 - b) Breadth-first search (BFS)
 - c) Dijkstra's algorithm
 - d) Prim's algorithm
- 7) Which of the following sorting algorithms repeatedly compares adjacent elements and swaps them if they are in the wrong order?
 - a) Insertion sort
 - b) Selection sort
 - c) Bubble sort
 - d) Merge sort

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Data Structures and Algorithms (BTN04405)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I**Q.2 Attempt any four:****16**

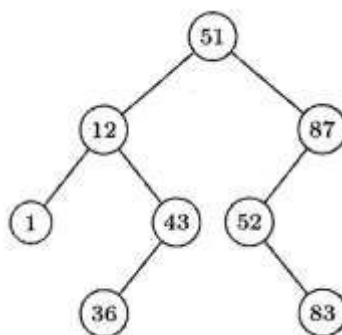
- Implement the C function for operations on the stack (Push, Pop, Peek, Traverse)
- What is Queue data structure? Describe all its operations.
- Convert the following infix expression into a postfix expression.
 - $(A + B) * C \setminus D$
 - $[((A + B) * (C - D)) + (F - G)]$
- Which are the advantages of Doubly linked list over singly linked list? Describe deletion operation of Doubly linked list
- With the help of diagram describe the insertion and deletion operation on circular queue.

Q.3 Attempt any Two:**12**

- What is the application of stack. Explain any two in details with example.
- Write a program to implement circular queue. Implement all operations.
- What is recursion? What are its types? Explain how recursion works.

Section – II**Q.4 Attempt any Four:****16**

- Explain the terms with proper example and diagram:
 - Hashing
 - Hashing Table
 - Hashing Function
- Write the algorithms/functions for Tree Traversals and for the given tree illustrate the traversals with proper diagram
 - in-order traversal
 - pre-order traversal
 - post-order traversal



- c) Describe bubble sort with help of suitable example.
- d) List and explain different types of graphs.
- e) Create a binary tree from the given traversing sequences. Show all steps.
In-order-ACD E I N O T U
Pre-order-E D C A U T I O N

Q.5 Attempt any Two:**12**

- a) Write a program to implement Quick Sort Algorithm. Given below is an array of 10 numbers apply the Quick Sort Algorithm and show various stages with a suitable diagram.
Array: 12, 55, 9, 21, 87, 39, 61, 10, 76, 50
- b) Write a program to implement both linear search and binary search. Explain with proper examples and diagram how it works.
- c) What is a graph? Explain with an example of how a graph is represented in memory. Discuss the applications of graphs.

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Data Structures and Algorithms (BTN04405)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following MCQs.

14

- 1) What is recursion in the context of programming?
 - a) A loop that repeats a block of code a specific number of times.
 - b) A function that calls itself to solve a problem by breaking it down into smaller subproblems.
 - c) A programming technique used to implement conditional statements.
 - d) A method to allocate memory dynamically during program execution.
- 2) Which of the following is NOT a type of graph?
 - a) Directed graph
 - b) Undirected graph
 - c) Weighted graph
 - d) Circular graph
- 3) Which of the following is a graph traversal method that explores all the vertices at the current level before moving to the next level?
 - a) Depth-first search (DFS)
 - b) Breadth-first search (BFS)
 - c) Dijkstra's algorithm
 - d) Prim's algorithm
- 4) Which of the following sorting algorithms repeatedly compares adjacent elements and swaps them if they are in the wrong order?
 - a) Insertion sort
 - b) Selection sort
 - c) Bubble sort
 - d) Merge sort
- 5) A hash collision resolution technique that uses linked list data structure is _____.
 - a) Open Addressing
 - b) Closed Addressing
 - c) Linear Probing
 - d) Quadratic Probing
- 6) The number of edges from the root to the node is called of the tree.
 - a) Height
 - b) Depth
 - c) Length
 - d) None of the mentioned
- 7) An algorithm that calls itself directly or indirectly is known as _____.
 - a) stack
 - b) recursion
 - c) graph
 - d) traversal algorithm

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Data Structures and Algorithms (BTN04405)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any four:

16

- Implement the C function for operations on the stack (Push, Pop, Peek, Traverse)
- What is Queue data structure? Describe all its operations.
- Convert the following infix expression into a postfix expression.
 - $(A + B) * C \setminus D$
 - $[((A + B) * (C - D)) + (F - G)]$
- Which are the advantages of Doubly linked list over singly linked list? Describe deletion operation of Doubly linked list
- With the help of diagram describe the insertion and deletion operation on circular queue.

Q.3 Attempt any Two:

12

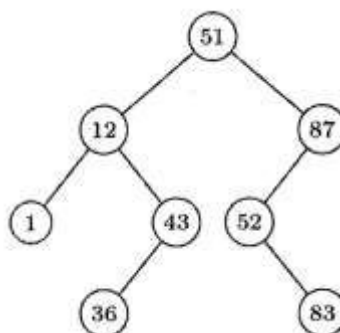
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- Write a program to implement circular queue. Implement all operations.
- What is recursion? What are its types? Explain how recursion works.

Section – II

Q.4 Attempt any Four:

16

- Explain the terms with proper example and diagram:
 - Hashing
 - Hashing Table
 - Hashing Function
- Write the algorithms/functions for Tree Traversals and for the given tree illustrate the traversals with proper diagram
 - in-order traversal
 - pre-order traversal
 - post-order traversal



- c) Describe bubble sort with help of suitable example.
- d) List and explain different types of graphs.
- e) Create a binary tree from the given traversing sequences. Show all steps.
In-order-ACD E I N O T U
Pre-order-E D C A U T I O N

Q.5 Attempt any Two:**12**

- a) Write a program to implement Quick Sort Algorithm. Given below is an array of 10 numbers apply the Quick Sort Algorithm and show various stages with a suitable diagram.
Array: 12, 55, 9, 21, 87, 39, 61, 10, 76, 50
- b) Write a program to implement both linear search and binary search. Explain with proper examples and diagram how it works.
- c) What is a graph? Explain with an example of how a graph is represented in memory. Discuss the applications of graphs.

Seat No.	
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Day & Date: Sunday, 26-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following MCQs.

14

- 1) In a graph, if an edge $e=[u,v]$, Then u and v are called _____.
 - a) Endpoints of e
 - b) Adjacent nodes
 - c) Neighbors
 - d) All of the above
- 2) In stack terminology, what is the term used to describe the removal of an element from the stack?
 - a) Pop
 - b) Push
 - c) Peek
 - d) Insert
- 3) What is the definition of a queue?
 - a) A data structure that follows the LIFO (Last-In, First-Out) principle.
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 - d) Stack
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 - b) Doubly linked list
 - c) Circular linked list
 - d) Static linked list
- 6) What is recursion in the context of programming?
 - a) A loop that repeats a block of code a specific number of times.
 - b) A function that calls itself to solve a problem by breaking it down into smaller subproblems.
 - c) A programming technique used to implement conditional statements.
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 - b) Undirected graph
 - c) Weighted graph
 - d) Circular graph

- 8) Which of the following is a graph traversal method that explores all the vertices at the current level before moving to the next level?
- a) Depth-first search (DFS) b) Breadth-first search (BFS)
c) Dijkstra's algorithm d) Prim's algorithm
- 9) Which of the following sorting algorithms repeatedly compares adjacent elements and swaps them if they are in the wrong order?
- a) Insertion sort b) Selection sort
c) Bubble sort d) Merge sort
- 10) A hash collision resolution technique that uses linked list data structure is ____.
- a) Open Addressing b) Closed Addressing
c) Linear Probing d) Quadratic Probing
- 11) The number of edges from the root to the node is called of the tree.
- a) Height b) Depth
c) Length d) None of the mentioned
- 12) An algorithm that calls itself directly or indirectly is known as ____.
- a) stack b) recursion
c) graph d) traversal algorithm
- 13) The operation of processing each element in the data structure is known as ____.
- a) sorting b) merging
c) inserting d) traversal
- 14) A Binary Tree can have ____.
- a) Can have 2 children b) Can have 1 children
c) Can have 0 children d) All of the above

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Data Structures and Algorithms (BTN04405)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any four:

16

- Implement the C function for operations on the stack (Push, Pop, Peek, Traverse)
- What is Queue data structure? Describe all its operations.
- Convert the following infix expression into a postfix expression.
 - $(A + B) * C \setminus D$
 - $[((A + B) * (C - D)) + (F - G)]$
- Which are the advantages of Doubly linked list over singly linked list? Describe deletion operation of Doubly linked list
- With the help of diagram describe the insertion and deletion operation on circular queue.

Q.3 Attempt any Two:

12

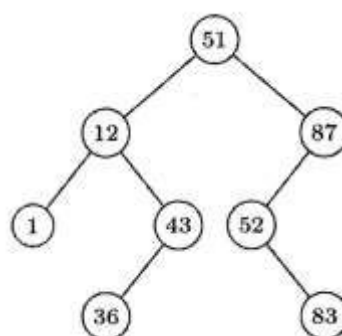
- What is the application of stack. Explain any two in details with example.
- Write a program to implement circular queue. Implement all operations.
- What is recursion? What are its types? Explain how recursion works.

Section – II

Q.4 Attempt any Four:

16

- Explain the terms with proper example and diagram:
 - Hashing
 - Hashing Table
 - Hashing Function
- Write the algorithms/functions for Tree Traversals and for the given tree illustrate the traversals with proper diagram
 - in-order traversal
 - pre-order traversal
 - post-order traversal



- c) Describe bubble sort with help of suitable example.
- d) List and explain different types of graphs.
- e) Create a binary tree from the given traversing sequences. Show all steps.
In-order-ACD E I N O T U
Pre-order-E D C A U T I O N

Q.5 Attempt any Two:**12**

- a) Write a program to implement Quick Sort Algorithm. Given below is an array of 10 numbers apply the Quick Sort Algorithm and show various stages with a suitable diagram.
Array: 12, 55, 9, 21, 87, 39, 61, 10, 76, 50
- b) Write a program to implement both linear search and binary search. Explain with proper examples and diagram how it works.
- c) What is a graph? Explain with an example of how a graph is represented in memory. Discuss the applications of graphs.

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options.

14

- 1) Voltage series feedback amplifier using op-amp is nothing but _____.
 a) Open loop Noninverting amplifier
 b) Non inverting Amplifier with feedback
 c) Inverting Amplifier with feedback
 d) Closed loop inverting Amplifier
- 2) The ratio of differential Voltage gain to common mode voltage gain is called as _____.
 a) CMRR
 b) SVRR
 c) Input offset voltage
 d) Slew rate
- 3) Zero crossing detector is special case of _____.
 a) Schmitt trigger
 b) Peak detector
 c) Basic comparator
 d) Window detector
- 4) What should be value of R1 resistor if $R_F = 10\text{ K}\Omega$ to have gain of 5 for non-inverting amplifier.
 a) $5\text{ K}\Omega$
 b) $2.5\text{ K}\Omega$
 c) 4Ω
 d) $2.5\text{ M}\Omega$
- 5) $A_F = \{1 + (R_f / R_1)\}$ is equation of voltage gain for _____.
 a) Inverting Amplifier
 b) Non inverting Amplifier
 c) Differential Amplifier
 d) Voltage follower
- 6) What is the disadvantage of binary weighted type DAC?
 a) Require wide range of resistors
 b) High operating frequency
 c) High power consumption
 d) Slow switching
- 7) In a D-A converter with binary weighted resistor, a desired step size can be obtained by Selecting
 a) Proper value of V_{FS}
 b) Proper value of R
 c) Proper value of R_F
 d) All of these

- 8) For Summing Amplifier in Inverting configuration the ratio of R_f / R is equal to _____.
a) One or greater than One b) Zero
c) Two d) $1/3$
- 9) For ideal OP-AMP the values of open loop gain & CMRR are _____.
a) ∞ & 0 b) 0 & ∞
c) ∞ & ∞ d) 0 & 0
- 10) What should be maximum bandwidth for a gain of 10 in case of IC 741?
a) 1 MHz b) 100KHz
c) 10 KHz d) 1KHz
- 11) A duty cycle is less than _____ in saw tooth wave generator.
a) 90% b) 66.66%
c) 50% d) 20%
- 12) For first order active filter gain roll off rate in stop band is _____.
a) 40 dB/decade b) 20 dB/decade
c) 90dB /decade d) 60 dB/decade
- 13) If square wave input is applied to an integrator, then output will be _____.
a) Inverted square wave b) Triangular wave
c) Sine wave d) Spike wave
- 14) Butterworth filter is also called as _____ filter.
a) Riple-ripple b) Riple-Flat
c) Flat-ripple d) Flat-Flat

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any Four from the following questions. 16

- For 741 AC Non-inverting amplifier with $R_1=R_2=R_3= 100\Omega$, $R_F=1\text{ M}\Omega$ & $V_{CC}=+15\text{V}$ $C_1=C_i=0.1\mu F$. Calculate bandwidth & max. output voltage swing.
- Derive equation for ideal voltage gain of Inverting amplifier using virtual ground concept.
- Define any four electrical parameters of IC 741 with practical & ideal values.
- Explain basic integrator with i/p & o/p waveforms.
- Design Non- inverting amplifier using op-amp for the voltage gain between 10 to 15.

Q.3 Answer any Two from the following questions. 12

- Draw high frequency equivalent circuit of op-amp & obtain expression for $A_{OL}(f)$ open loop gain as function of frequency.
- Explain instrumentation amplifier with transducer bridge & derive expression of output voltage.
- Derive expressions for gain A_d for DIBO differential amplifier using AC equivalent circuit.

Section – II

Q.4 Answer any Four from the following questions. 16

- Explain successive approximation ADC with circuit diagram & waveforms.
- Draw & Explain op-amp precision full wave rectifier with i/p & o/p waveforms.
- Design RC phase shift oscillator using op-amp 741 for output frequency of 200 Hz. (Assume $C = 0.1\mu F$)
- Explain op-amp square wave generator with circuit diagram & waveforms.
- Explain with neat diagram operation of window detector using op-amp.

Q.5 Answer any Two from the following questions. 12

- Calculate V_{ut} , V_{lt} , hysteresis voltage & draw o/p waveform for op-amp Schmitt trigger circuit With $V_{in} = 1\text{ Vp-p}$ sine wave signal, $\pm V_{CC} = 15\text{ V}$, $R_1 = 100\Omega$, $R_2 = 56\text{ k}\Omega$ & IC 741.
- Design & explain first order low pass filter at cutoff frequency of 1 KHz with a pass band gain of 2.
- Explain op-amp triangular wave generator with circuit diagram & waveforms.

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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options.

14

- 1) For Summing Amplifier in Inverting configuration the ratio of R_f / R is equal to _____.
 a) One or greater than One b) Zero
 c) Two d) $1/3$
- 2) For ideal OP-AMP the values of open loop gain & CMRR are _____.
 a) ∞ & 0 b) 0 & ∞
 c) ∞ & ∞ d) 0 & 0
- 3) What should be maximum bandwidth for a gain of 10 in case of IC 741?
 a) 1 MHz b) 100KHz
 c) 10 KHz d) 1KHz
- 4) A duty cycle is less than _____ in saw tooth wave generator.
 a) 90% b) 66.66%
 c) 50% d) 20%
- 5) For first order active filter gain roll off rate in stop band is _____.
 a) 40 dB/decade b) 20 dB/decade
 c) 90dB /decade d) 60 dB/decade
- 6) If square wave input is applied to a integrator, then output will be _____.
 a) Inverted square wave b) Triangular wave
 c) Sine wave d) Spike wave
- 7) Butterworth filter is also called as _____ filter.
 a) Riple-riple b) Riple-Flat
 c) Flat-riple d) Flat-Flat
- 8) Voltage series feedback amplifier using op-amp is nothing but _____.
 a) Open loop Noninverting amplifier
 b) Non inverting Amplifier with feedback
 c) Inverting Amplifier with feedback
 d) Closed loop inverting Amplifier

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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any Four from the following questions. 16

- a) For 741 AC Non-inverting amplifier with $R_1=R_2=R_3= 100\Omega$, $R_F=1\text{ M}\Omega$ & $V_{CC}=+15\text{V}$ $C_1=C_i=0.1\mu F$. Calculate bandwidth & max. output voltage swing.
- b) Derive equation for ideal voltage gain of Inverting amplifier using virtual ground concept.
- c) Define any four electrical parameters of IC 741 with practical & ideal values.
- d) Explain basic integrator with i/p & o/p waveforms.
- e) Design Non- inverting amplifier using op-amp for the voltage gain between 10 to 15.

Q.3 Answer any Two from the following questions. 12

- a) Draw high frequency equivalent circuit of op-amp & obtain expression for $A_{OL}(f)$ open loop gain as function of frequency.
- b) Explain instrumentation amplifier with transducer bridge & derive expression of output voltage.
- c) Derive expressions for gain A_d for DIBO differential amplifier using AC equivalent circuit.

Section – II

Q.4 Answer any Four from the following questions. 16

- a) Explain successive approximation ADC with circuit diagram & waveforms.
- b) Draw & Explain op-amp precision full wave rectifier with i/p & o/p waveforms.
- c) Design RC phase shift oscillator using op-amp 741 for output frequency of 200 Hz. (Assume $C = 0.1\mu F$)
- d) Explain op-amp square wave generator with circuit diagram & waveforms.
- e) Explain with neat diagram operation of window detector using op-amp.

Q.5 Answer any Two from the following questions. 12

- a) Calculate V_{ut} , V_{lt} , hysteresis voltage & draw o/p waveform for op-amp Schmitt trigger circuit With $V_{in} = 1\text{ Vp-p}$ sine wave signal, $\pm V_{CC} = 15\text{ V}$, $R_1 = 100\Omega$, $R_2 = 56\text{ k}\Omega$ & IC 741.
- b) Design & explain first order low pass filter at cutoff frequency of 1 KHz with a pass band gain of 2.
- c) Explain op-amp triangular wave generator with circuit diagram & waveforms.

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Set **R**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options.

14

- 1) A duty cycle is less than ____ in saw tooth wave generator.
 - a) 90%
 - b) 66.66%
 - c) 50%
 - d) 20%
- 2) For first order active filter gain roll off rate in stop band is _____.
 - a) 40 dB/decade
 - b) 20 dB/decade
 - c) 90dB /decade
 - d) 60 dB/decade
- 3) If square wave input is applied to a integrator, then output will be _____.
 - a) Inverted square wave
 - b) Triangular wave
 - c) Sine wave
 - d) Spike wave
- 4) Butterworth filter is also called as _____ filter.
 - a) Riple-riple
 - b) Riple-Flat
 - c) Flat-riple
 - d) Flat-Flat
- 5) Voltage series feedback amplifier using op-amp is nothing but _____.
 - a) Open loop Noninverting amplifier
 - b) Non inverting Amplifier with feedback
 - c) Inverting Amplifier with feedback
 - d) Closed loop inverting Amplifier
- 6) The ratio of differential Voltage gain to common mode voltage gain is called as _____.
 - a) CMRR
 - b) SVRR
 - c) Input offset voltage
 - d) Slew rate
- 7) Zero crossing detector is special case of _____.
 - a) Schmitt trigger
 - b) Peak detector
 - c) Basic comparator
 - d) Window detector
- 8) What should be value of R1 resistor if $R_F = 10\text{ K}\Omega$ to have gain of 5 for non-inverting amplifier.
 - a) $5\text{ K}\Omega$
 - b) $2.5\text{ K}\Omega$
 - c) 4Ω
 - d) $2.5\text{M}\Omega$

- 9) $A_F = \{1 + (R_f / R_1)\}$ is equation of voltage gain for _____.
a) Inverting Amplifier b) Non inverting Amplifier
c) Differential Amplifier d) Voltage follower
- 10) What is the disadvantage of binary weighted type DAC?
a) Require wide range of resistors
b) High operating frequency
c) High power consumption
d) Slow switching
- 11) In a D-A converter with binary weighted resistor, a desired step size can be obtained by Selecting
a) Proper value of V_{FS} b) Proper value of R
c) Proper value of R_F d) All of these
- 12) For Summing Amplifier in Inverting configuration the ratio of R_f / R is equal to _____.
a) One or greater than One b) Zero
c) Two d) $1/3$
- 13) For ideal OP-AMP the values of open loop gain & CMRR are _____.
a) ∞ & 0 b) 0 & ∞
c) ∞ & ∞ d) 0 & 0
- 14) What should be maximum bandwidth for a gain of 10 in case of IC 741?
a) 1 MHz b) 100KHz
c) 10 KHz d) 1KHz

Seat No.	
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Set R

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any Four from the following questions. 16

- a) For 741 AC Non-inverting amplifier with $R_1=R_2=R_3= 100\Omega$, $R_F=1\text{ M}\Omega$ & $V_{CC}=+15\text{V}$ $C_1=C_i=0.1\mu F$. Calculate bandwidth & max. output voltage swing.
- b) Derive equation for ideal voltage gain of Inverting amplifier using virtual ground concept.
- c) Define any four electrical parameters of IC 741 with practical & ideal values.
- d) Explain basic integrator with i/p & o/p waveforms.
- e) Design Non- inverting amplifier using op-amp for the voltage gain between 10 to 15.

Q.3 Answer any Two from the following questions. 12

- a) Draw high frequency equivalent circuit of op-amp & obtain expression for $A_{OL}(f)$ open loop gain as function of frequency.
- b) Explain instrumentation amplifier with transducer bridge & derive expression of output voltage.
- c) Derive expressions for gain A_d for DIBO differential amplifier using AC equivalent circuit.

Section – II

Q.4 Answer any Four from the following questions. 16

- a) Explain successive approximation ADC with circuit diagram & waveforms.
- b) Draw & Explain op-amp precision full wave rectifier with i/p & o/p waveforms.
- c) Design RC phase shift oscillator using op-amp 741 for output frequency of 200 Hz. (Assume $C = 0.1\mu F$)
- d) Explain op-amp square wave generator with circuit diagram & waveforms.
- e) Explain with neat diagram operation of window detector using op-amp.

Q.5 Answer any Two from the following questions. 12

- a) Calculate V_{ut} , V_{lt} , hysteresis voltage & draw o/p waveform for op-amp Schmitt trigger circuit With $V_{in} = 1\text{ Vp-p}$ sine wave signal, $\pm V_{CC} = 15\text{ V}$, $R_1 = 100\Omega$, $R_2 = 56\text{ k}\Omega$ & IC 741.
- b) Design & explain first order low pass filter at cutoff frequency of 1 KHz with a pass band gain of 2.
- c) Explain op-amp triangular wave generator with circuit diagram & waveforms.

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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options.

14

- 1) What is the disadvantage of binary weighted type DAC?
 - a) Require wide range of resistors
 - b) High operating frequency
 - c) High power consumption
 - d) Slow switching
- 2) In a D-A converter with binary weighted resistor, a desired step size can be obtained by Selecting
 - a) Proper value of V_{FS}
 - b) Proper value of R
 - c) Proper value of R_F
 - d) All of these
- 3) For Summing Amplifier in Inverting configuration the ratio of R_f / R is equal to _____.
 - a) One or greater than One
 - b) Zero
 - c) Two
 - d) $1/3$
- 4) For ideal OP-AMP the values of open loop gain & CMRR are _____.
 - a) ∞ & 0
 - b) 0 & ∞
 - c) ∞ & ∞
 - d) 0 & 0
- 5) What should be maximum bandwidth for a gain of 10 in case of IC 741?
 - a) 1 MHz
 - b) 100KHz
 - c) 10 KHz
 - d) 1KHz
- 6) A duty cycle is less than _____ in saw tooth wave generator.
 - a) 90%
 - b) 66.66%
 - c) 50%
 - d) 20%
- 7) For first order active filter gain roll off rate in stop band is _____.
 - a) 40 dB/decade
 - b) 20 dB/decade
 - c) 90dB /decade
 - d) 60 dB/decade
- 8) If square wave input is applied to an integrator, then output will be _____.
 - a) Inverted square wave
 - b) Triangular wave
 - c) Sine wave
 - d) Spike wave

Seat No.	
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Set **S**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Integrated Circuits (BTN04403)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any Four from the following questions. **16**

- For 741 AC Non-inverting amplifier with $R_1=R_2=R_3= 100\Omega$, $R_F=1\text{ M}\Omega$ & $V_{CC}=+15\text{V}$ $C_1=C_i=0.1\mu F$. Calculate bandwidth & max. output voltage swing.
- Derive equation for ideal voltage gain of Inverting amplifier using virtual ground concept.
- Define any four electrical parameters of IC 741 with practical & ideal values.
- Explain basic integrator with i/p & o/p waveforms.
- Design Non- inverting amplifier using op-amp for the voltage gain between 10 to 15.

Q.3 Answer any Two from the following questions. **12**

- Draw high frequency equivalent circuit of op-amp & obtain expression for $A_{OL}(f)$ open loop gain as function of frequency.
- Explain instrumentation amplifier with transducer bridge & derive expression of output voltage.
- Derive expressions for gain A_d for DIBO differential amplifier using AC equivalent circuit.

Section – II

Q.4 Answer any Four from the following questions. **16**

- Explain successive approximation ADC with circuit diagram & waveforms.
- Draw & Explain op-amp precision full wave rectifier with i/p & o/p waveforms.
- Design RC phase shift oscillator using op-amp 741 for output frequency of 200 Hz. (Assume $C = 0.1\mu F$)
- Explain op-amp square wave generator with circuit diagram & waveforms.
- Explain with neat diagram operation of window detector using op-amp.

Q.5 Answer any Two from the following questions. **12**

- Calculate V_{ut} , V_{lt} , hysteresis voltage & draw o/p waveform for op-amp Schmitt trigger circuit With $V_{in} = 1\text{ Vp-p}$ sine wave signal, $\pm V_{CC} = 15\text{ V}$, $R_1 = 100\Omega$, $R_2 = 56\text{ k}\Omega$ & IC 741.
- Design & explain first order low pass filter at cutoff frequency of 1 KHz with a pass band gain of 2.
- Explain op-amp triangular wave generator with circuit diagram & waveforms.

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Select suitable option

14

- 1) The advantage of modulation techniques is/ are _____.
 a) Increase the range of communication
 b) Reduces the height of antenna
 c) improves quality of reception
 d) All of these
- 2) The noise level in the system is proportional to _____.
 a) Temperature
 b) Bandwidth
 c) Resistance
 d) All of these
- 3) The noise figure of a communication system _____.
 a) varies linearly as T_{eq}
 b) varies linearly as T_{eq}^2
 c) varies linearly as $1/T_{eq}$
 d) does not vary with T_{eq}
- 4) When E_1, E_2, E_3 and E_4 are simultaneous modulating voltages, then the total modulating voltage will be?
 a) $E_1 + E_2 + E_3 + E_4$
 b) $(E_1 + E_2 + E_3 + E_4)/4$
 c) $\sqrt{E_1 E_2 + E_3 E_4}$
 d) $\sqrt{E_1^2 + E_2^2 + E_3^2 + E_4^2}$
- 5) One of the advantage of base modulation over collector modulation of a transistor class C amplifier is _____.
 a) The lower modulating power required
 b) Higher power output per transistors
 c) Better efficiency
 d) Better linearity
- 6) Which of the following statements is true about pulse modulation?
 a) It requires a continuous carrier signal for transmission
 b) It is immune to noise and distortion
 c) It provides efficient bandwidth utilization
 d) It is suitable for long-distance communication
- 7) Pulse position modulation (PPM) is a technique where information is encoded in the:
 a) Amplitude of the pulses
 b) Frequency of the pulses
 c) Width of the pulses
 d) Position of the pulses

- 8) The bandwidth required of AM wave is _____.
a) $2f_m$ where f_m is the highest modulating frequency
b) f_m where f_m is the highest modulating frequency
c) $2nf_m$, where n is number of significant sidebands
d) $f_m + f_c$ where f_c is the carrier frequency.
- 9) In conventional AM superhetrodyne receivers, the detectors employed to extract intelligence include _____.
a) peak detectors
b) ratio detectors
c) phase locked loops
d) slope detectors
- 10) The IF amplifier in receiver is _____.
a) Single stage single tuned amplifier
b) Two stage of single tuned amplifier
c) Double tuned amplifier
d) Class C amplifier
- 11) Double spotting in superhetrodyne receiver is caused by _____.
a) Poor front end rejection
b) Misalignment of receiver
c) Detuning of one or more IF amplifier stages
d) Non functioning of ACG.
- 12) The minimum value of noise factor is _____.
a) Zero
b) One
c) 10
d) 100
- 13) Delta modulation is a technique used for:
a) High-quality audio transmission
b) Image compression
c) Video streaming
d) Low-bit-rate speech transmission
- 14) The ionosphere plays a significant role in radio wave propagation at _____.
a) high frequency
b) microwaves frequencies
c) ultra high frequency
d) optical frequencies

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any Four. **16**

- a) Why modulation is required?
- b) What are the different types of communication channels?
- c) Explain Negative feedback Circuitry.
- d) Draw and explain superhetrodyne receiver.
- e) Define Bandwidth. The resonant frequency of RF amplifier of a receiver is 1MHz and its bandwidth is 10 KHz. What is the Q Factor?

Q.3 Attempt any Two. **12**

- a) The output voltage of a transmitter is given by-
 $400(1 + 0.4 \sin 6280t) \sin (3.14 \times 10^7 t)$. This voltage is fed to a load of 600 Ω resistance.
Determine
 - 1) Carrier frequency
 - 2) Modulating frequency
 - 3) Carrier power
 - 4) Total power output
 - 5) Peak power output.
- b) Comparison between DSB, SSB, ISB and VSB with different parameters.
- c) Draw and explain TRF radio receiver. Discuss its advantages and disadvantages

Section – II

Q.4 Attempt any Four. **16**

- a) The carrier swing of a frequency modulated signal is 70 KHz and the modulating signal is a 7 KHz sine wave determine the modulation index of the FM signal.
- b) Explain pre-emphasis and de emphasis in brief.
- c) Explain a PWM modulator using IC 555.
- d) Define characteristics of antenna.
- e) Explain Sky wave propagation.

Q.5 Attempt any Two. **12**

- a) With suitable circuit diagram explain a frequency modulation of a crystal oscillator with a varactor diode.
- b) With suitable diagram explain direct method of PWM and PPM generation
- c) Derive an expression for maximum frequency deviation in PM.

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Select suitable option

14

- 1) The bandwidth required of AM wave is _____.
 a) $2f_m$ where f_m is the highest modulating frequency
 b) f_m where f_m is the highest modulating frequency
 c) $2nf_m$, where n is number of significant sidebands
 d) $f_m + f_c$ where f_c is the carrier frequency.
- 2) In conventional AM superhetrodyne receivers ,the detectors employed to extract intelligence include _____.
 a) peak detectors
 b) ratio detectors
 c) phase locked loops
 d) slope detectors
- 3) The IF amplifier in receiver is _____.
 a) Single stage single tuned amplifier
 b) Two stage of single tuned amplifier
 c) Double tuned amplifier
 d) Class C amplifier
- 4) Double spotting in superhetrodyne receiver is caused by _____.
 a) Poor front end rejection
 b) Misalignment of receiver
 c) Detuning of one or more IF amplifier stages
 d) Non functioning of ACG.
- 5) The minimum value of noise factor is _____.
 a) Zero
 b) One
 c) 10
 d) 100
- 6) Delta modulation is a technique used for:
 a) High-quality audio transmission
 b) Image compression
 c) Video streaming
 d) Low-bit-rate speech transmission
- 7) The ionosphere plays a significant role in radio wave propagation at _____.
 a) high frequency
 b) microwaves frequencies
 c) ultra high frequency
 d) optical frequencies

- 8) The advantage of modulation techniques is/ are _____.
a) Increase the range of communication
b) Reduces the height of antenna
c) improves quality of reception
d) All of these
- 9) The noise level in the system is proportional to _____.
a) Temperature
b) Bandwidth
c) Resistance
d) All of these
- 10) The noise figure of a communication system _____.
a) varies linearly as T_{eq}
b) varies linearly as T_{eq}^2
c) varies linearly as $1/T_{eq}$
d) does not vary with T_{eq}
- 11) When E_1, E_2, E_3 and E_4 are simultaneous modulating voltages, then the total modulating voltage will be?
a) $E_1 + E_2 + E_3 + E_4$
b) $(E_1 + E_2 + E_3 + E_4)/4$
c) $\sqrt{E_1 E_2 + E_3 E_4}$
d) $\sqrt{E_1^2 + E_2^2 + E_3^2 + E_4^2}$
- 12) One of the advantage of base modulation over collector modulation of a transistor class C amplifier is _____.
a) The lower modulating power required
b) Higher power output per transistors
c) Better efficiency
d) Better linearity
- 13) Which of the following statements is true about pulse modulation?
a) It requires a continuous carrier signal for transmission
b) It is immune to noise and distortion
c) It provides efficient bandwidth utilization
d) It is suitable for long-distance communication
- 14) Pulse position modulation (PPM) is a technique where information is encoded in the:
a) Amplitude of the pulses
b) Frequency of the pulses
c) Width of the pulses
d) Position of the pulses

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any Four. **16**

- a) Why modulation is required?
- b) What are the different types of communication channels?
- c) Explain Negative feedback Circuitry.
- d) Draw and explain superhetrodyne receiver.
- e) Define Bandwidth. The resonant frequency of RF amplifier of a receiver is 1MHz and its bandwidth is 10 KHz. What is the Q Factor?

Q.3 Attempt any Two. **12**

- a) The output voltage of a transmitter is given by-
 $400(1 + 0.4 \sin 6280t) \sin (3.14 \times 10^7 t)$. This voltage is fed to a load of 600 Ω resistance.
Determine
 - 1) Carrier frequency
 - 2) Modulating frequency
 - 3) Carrier power
 - 4) Total power output
 - 5) Peak power output.
- b) Comparison between DSB, SSB, ISB and VSB with different parameters.
- c) Draw and explain TRF radio receiver. Discuss its advantages and disadvantages

Section – II

Q.4 Attempt any Four. **16**

- a) The carrier swing of a frequency modulated signal is 70 KHz and the modulating signal is a 7 KHz sine wave determine the modulation index of the FM signal.
- b) Explain pre-emphasis and de emphasis in brief.
- c) Explain a PWM modulator using IC 555.
- d) Define characteristics of antenna.
- e) Explain Sky wave propagation.

Q.5 Attempt any Two. **12**

- a) With suitable circuit diagram explain a frequency modulation of a crystal oscillator with a varactor diode.
- b) With suitable diagram explain direct method of PWM and PPM generation
- c) Derive an expression for maximum frequency deviation in PM.

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Select suitable option

14

- 1) Double spotting in superhetrodyne receiver is caused by _____.
 a) Poor front end rejection
 b) Misalignment of receiver
 c) Detuning of one or more IF amplifier stages
 d) Non functioning of ACG.
- 2) The minimum value of noise factor is _____.
 a) Zero
 b) One
 c) 10
 d) 100
- 3) Delta modulation is a technique used for:
 a) High-quality audio transmission
 b) Image compression
 c) Video streaming
 d) Low-bit-rate speech transmission
- 4) The ionosphere plays a significant role in radio wave propagation at _____.
 a) high frequency
 b) microwaves frequencies
 c) ultra high frequency
 d) optical frequencies
- 5) The advantage of modulation techniques is/ are _____.
 a) Increase the range of communication
 b) Reduces the height of antenna
 c) improves quality of reception
 d) All of these
- 6) The noise level in the system is proportional to _____.
 a) Temperature
 b) Bandwidth
 c) Resistance
 d) All of these
- 7) The noise figure of a communication system _____.
 a) varies linearly as T_{eq}
 b) varies linearly as T_{eq}^2
 c) varies linearly as $1/T_{eq}$
 d) does not vary with T_{eq}

Seat No.	
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Set	R
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any Four. **16**

- a) Why modulation is required?
- b) What are the different types of communication channels?
- c) Explain Negative feedback Circuitry.
- d) Draw and explain superhetrodyne receiver.
- e) Define Bandwidth. The resonant frequency of RF amplifier of a receiver is 1MHz and its bandwidth is 10 KHz. What is the Q Factor?

Q.3 Attempt any Two. **12**

- a) The output voltage of a transmitter is given by-
 $400(1 + 0.4 \sin 6280t) \sin (3.14 \times 10^7 t)$. This voltage is fed to a load of 600 Ω resistance.
Determine
 - 1) Carrier frequency
 - 2) Modulating frequency
 - 3) Carrier power
 - 4) Total power output
 - 5) Peak power output.
- b) Comparison between DSB, SSB, ISB and VSB with different parameters.
- c) Draw and explain TRF radio receiver. Discuss its advantages and disadvantages

Section – II

Q.4 Attempt any Four. **16**

- a) The carrier swing of a frequency modulated signal is 70 KHz and the modulating signal is a 7 KHz sine wave determine the modulation index of the FM signal.
- b) Explain pre-emphasis and de emphasis in brief.
- c) Explain a PWM modulator using IC 555.
- d) Define characteristics of antenna.
- e) Explain Sky wave propagation.

Q.5 Attempt any Two. **12**

- a) With suitable circuit diagram explain a frequency modulation of a crystal oscillator with a varactor diode.
- b) With suitable diagram explain direct method of PWM and PPM generation
- c) Derive an expression for maximum frequency deviation in PM.

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
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Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Select suitable option

14

- 1) Which of the following statements is true about pulse modulation?
 - a) It requires a continuous carrier signal for transmission
 - b) It is immune to noise and distortion
 - c) It provides efficient bandwidth utilization
 - d) It is suitable for long-distance communication
- 2) Pulse position modulation (PPM) is a technique where information is encoded in the:
 - a) Amplitude of the pulses
 - b) Frequency of the pulses
 - c) Width of the pulses
 - d) Position of the pulses
- 3) The bandwidth required of AM wave is _____.
 - a) $2f_m$ where f_m is the highest modulating frequency
 - b) f_m where f_m is the highest modulating frequency
 - c) $2nf_m$, where n is number of significant sidebands
 - d) $f_m + f_c$ where f_c is the carrier frequency.
- 4) In conventional AM superhetrodyne receivers ,the detectors employed to extract intelligence include _____.
 - a) peak detectors
 - b) ratio detectors
 - c) phase locked loops
 - d) slope detectors
- 5) The IF amplifier in receiver is _____.
 - a) Single stage single tuned amplifier
 - b) Two stage of single tuned amplifier
 - c) Double tuned amplifier
 - d) Class C amplifier
- 6) Double spotting in superhetrodyne receiver is caused by _____.
 - a) Poor front end rejection
 - b) Misalignment of receiver
 - c) Detuning of one or more IF amplifier stages
 - d) Non functioning of ACG.

- Page 11 of 12

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Analog Communication (BTN04404)

Day & Date: Thursday, 30-05-2024
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Max. Marks: 56

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3) Assume suitable data if necessary.

Section – I

Q.2 Attempt any Four. **16**

- a) Why modulation is required?
- b) What are the different types of communication channels?
- c) Explain Negative feedback Circuitry.
- d) Draw and explain superhetrodyne receiver.
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- a) The output voltage of a transmitter is given by-
 $400(1 + 0.4 \sin 6280t) \sin (3.14 \times 10^7 t)$. This voltage is fed to a load of 600 Ω resistance.
Determine
 - 1) Carrier frequency
 - 2) Modulating frequency
 - 3) Carrier power
 - 4) Total power output
 - 5) Peak power output.
- b) Comparison between DSB, SSB, ISB and VSB with different parameters.
- c) Draw and explain TRF radio receiver. Discuss its advantages and disadvantages

Section – II

Q.4 Attempt any Four. **16**

- a) The carrier swing of a frequency modulated signal is 70 KHz and the modulating signal is a 7 KHz sine wave determine the modulation index of the FM signal.
- b) Explain pre-emphasis and de emphasis in brief.
- c) Explain a PWM modulator using IC 555.
- d) Define characteristics of antenna.
- e) Explain Sky wave propagation.

Q.5 Attempt any Two. **12**

- a) With suitable circuit diagram explain a frequency modulation of a crystal oscillator with a varactor diode.
- b) With suitable diagram explain direct method of PWM and PPM generation
- c) Derive an expression for maximum frequency deviation in PM.

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Computational Statistics (BTN04407)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data wherever needed and mention it clearly.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) Three companies A, B and C supply 25%, 35% and 40% of the notebooks to a school. Past experience shows that 5%, 4% and 2% of the notebooks produced by these companies are defective. If a notebook was found to be defective, what is the probability that the notebook was supplied by A?

a) $\frac{44}{69}$	b) $\frac{25}{69}$
c) $\frac{13}{24}$	d) $\frac{11}{24}$
- 2) What is the probability of getting a number greater than 6 on dice?

a) 1	b) $\frac{1}{3}$
c) $\frac{1}{2}$	d) 0
- 3) _____ is an incredibly powerful tool for analysing data.

a) Linear regression	b) Logistic regression
c) Gradient Descent	d) Greedy algorithms
- 4) In syntax of linear model $\text{lm}(\text{formula}, \text{data}, \dots)$, data refers to _____.

a) Matrix	b) Vector
c) Array	d) List
- 5) The matrix which follows the conditions $m=n$ is called?

a) Square matrix	b) Rectangular matrix
c) Scalar matrix	d) Diagonal matrix
- 6) How many coefficients do you need to estimate in a simple linear regression model (One independent variable)?

a) 1	b) 2
c) 3	d) 4
- 7) How many outcomes are possible when drawing a card from deck of cards?

a) 1	b) 13
c) 52	d) 26
- 8) PCA reduce dimensionality of the data using feature extraction.

a) True	b) False
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- 9) If machine learning model output doesn't involve target variable then that model is called as _____
- a) predictive model
 - b) descriptive model
 - c) both a & b
 - d) None of these
- 10) Identify the kind of learning algorithm for "facial identities for facial expressions"
- a) Prediction
 - b) Pattern recognition
 - c) Recognize anomalies
 - d) Generating Pattern
- 11) Identify the type of learning in which labelled training data is used.
- a) Semi supervised
 - b) Supervised learning
 - c) Reinforcement learning
 - d) Unsupervised learning
- 12) Which of the following are common classes of problems in machine learning?
- a) Regression
 - b) Classification
 - c) Clustering
 - d) All of above
- 13) Choose a disadvantage of decision trees among the following.
- a) Decision trees are robust to outliers
 - b) Factor analysis
 - c) Decision trees are prone to overfit
 - d) All of above
- 14) What will happen when eigenvalues are roughly equal?
- a) PCA will perform outstandingly
 - b) PCA will perform badly
 - c) Can't Say
 - d) None of above

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Computational Statistics (BTN04407)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section - I

Q.2 Solve any Four questions. 16

- a) Define the following terms:
 - i) Learning
 - ii) LMS weight update rule
 - iii) Consistent Hypothesis
 - iv) General Boundary
- b) Explain various rules in probability with proper example
- c) Explain Gaussian process with example.
- d) Write note of Problem Formulation
- e) Differentiate between regression and classification.

Q.3 Solve any Two questions. 12

- a) Enlist & explain steps involved in development of regression model.
- b) Write short note on construction of probability space. Explain Discrete and Continuous Probabilities.
- c) Develop procedure in parameter estimation for Bayesian parameter estimation.

Section - II

Q.4 Solve any Four questions. 16

- a) Differentiate between Supervised, Unsupervised in detail.
- b) Explain overfitting and under fitting with an example.
- c) What is training data, labeled data & unlabeled data? What are key steps involved in developing training data?
- d) Explain curse of dimensionality with suitable diagram.
- e) What are the basic design issues and approaches to machine learning?

Q.5 Solve any Two questions. 12

- a) What do you mean by a well - posed learning problem? Explain the important features that are required to well - define a learning problem.
- b) Write a note on Decision theory and Information Theory.
- c) What is principal component analysis? Explain the sort of problems you would use PCA for? Also explain its limitations as a method.

Seat No.	
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Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

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Marks:14

14

- 1) PCA reduce dimensionality of the data using feature extraction.
a) True b) False
- 2) If machine learning model output doesn't involves target variable then that model is called as _____
a) predictive model b) descriptive model
c) both a & b d) None of these
- 3) Identify the kind of learning algorithm for “facial identities for facial expressions”
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c) Clustering d) All of above
- 6) Choose a disadvantage of decision trees among the following.
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c) Decision trees are prone to overfit
d) All of above
- 7) What will happen when eigenvalues are roughly equal?
a) PCA will perform outstandingly b) PCA will perform badly
c) Can't Say d) None of above

Seat No.	
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Set	Q
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Computational Statistics (BTN04407)

Day & Date: Saturday, 01-06-2024
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Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Computational Statistics (BTN04407)

Day & Date: Saturday, 01-06-2024
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Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) Identify the type of learning in which labelled training data is used.

a) Semi supervised	b) Supervised learning
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- 2) Which of the following are common classes of problems in machine learning?

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a) PCA will perform outstandingly	b) PCA will perform badly
c) Can't Say	d) None of above
- 5) Three companies A, B and C supply 25%, 35% and 40% of the notebooks to a school. Past experience shows that 5%, 4% and 2% of the notebooks produced by these companies are defective. If a notebook was found to be defective, what is the probability that the notebook was supplied by A?

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c) $\frac{13}{24}$	d) $\frac{11}{24}$
- 6) What is the probability of getting a number greater than 6 on dice?

a) 1	b) $\frac{1}{3}$
c) $\frac{1}{2}$	d) 0
- 7) _____ is an incredibly powerful tool for analysing data.

a) Linear regression	b) Logistic regression
c) Gradient Descent	d) Greedy algorithms

Seat No.	
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Set	R
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Computational Statistics (BTN04407)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section - I

Q.2 Solve any Four questions. 16

- a) Define the following terms:
 - i) Learning
 - ii) LMS weight update rule
 - iii) Consistent Hypothesis
 - iv) General Boundary
- b) Explain various rules in probability with proper example
- c) Explain Gaussian process with example.
- d) Write note of Problem Formulation
- e) Differentiate between regression and classification.

Q.3 Solve any Two questions. 12

- a) Enlist & explain steps involved in development of regression model.
- b) Write short note on construction of probability space. Explain Discrete and Continuous Probabilities.
- c) Develop procedure in parameter estimation for Bayesian parameter estimation.

Section - II

Q.4 Solve any Four questions. 16

- a) Differentiate between Supervised, Unsupervised in detail.
- b) Explain overfitting and under fitting with an example.
- c) What is training data, labeled data & unlabeled data? What are key steps involved in developing training data?
- d) Explain curse of dimensionality with suitable diagram.
- e) What are the basic design issues and approaches to machine learning?

Q.5 Solve any Two questions. 12

- a) What do you mean by a well - posed learning problem? Explain the important features that are required to well - define a learning problem.
- b) Write a note on Decision theory and Information Theory.
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Day & Date: Saturday, 01-06-2024
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- 4) Assume suitable data wherever needed and mention it clearly.

Marks:14

14

- Page 10 of 12

- 9) What will happen when eigenvalues are roughly equal?
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c) $\frac{13}{24}$ d) $\frac{11}{24}$
- 11) What is the probability of getting a number greater than 6 on dice?
a) 1 b) $\frac{1}{3}$
c) $\frac{1}{2}$ d) 0
- 12) _____ is an incredibly powerful tool for analysing data.
a) Linear regression b) Logistic regression
c) Gradient Descent d) Greedy algorithms
- 13) In syntax of linear model `lm(formula, data,...)`, data refers to _____.
a) Matrix b) Vector
c) Array d) List
- 14) The matrix which follows the conditions $m=n$ is called?
a) Square matrix b) Rectangular matrix
c) Scalar matrix d) Diagonal matrix

Seat No.	
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Set S**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****ELECTRONICS ENGINEERING****Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section - I

Q.2 Solve any Four questions. 16

- a) Define the following terms:
 - i) Learning
 - ii) LMS weight update rule
 - iii) Consistent Hypothesis
 - iv) General Boundary
- b) Explain various rules in probability with proper example
- c) Explain Gaussian process with example.
- d) Write note of Problem Formulation
- e) Differentiate between regression and classification.

Q.3 Solve any Two questions. 12

- a) Enlist & explain steps involved in development of regression model.
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Section - II

Q.4 Solve any Four questions. 16

- a) Differentiate between Supervised, Unsupervised in detail.
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- a) What do you mean by a well - posed learning problem? Explain the important features that are required to well - define a learning problem.
- b) Write a note on Decision theory and Information Theory.
- c) What is principal component analysis? Explain the sort of problems you would use PCA for? Also explain its limitations as a method.

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Database Management Systems (BTN04408)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) What database tool would you use to find answers to your questions about data stored in your database?
 - a) Queries
 - b) Tables
 - c) Show
 - d) Q&A
- 2) Relational calculus is a _____.
 - a) Procedural language
 - b) Non- Procedural language
 - c) Data definition language
 - d) High level language
- 3) Which one of the following statements is false?
 - a) The data dictionary is normally maintained by the data base administrator
 - b) Data elements in the database can be modified by changing the data dictionary.
 - c) The data dictionary contains the name and description of each data element
 - d) The data dictionary is a tool used exclusively by the database administrator
- 4) The natural join is equal to: _____.
 - a) Cartesian Product
 - b) Combination of Union and Cartesian product
 - c) Combination of selection and Cartesian product
 - d) Combination of projection and Cartesian product
- 5) In E-R Diagram relationship type is represented by _____.
 - a) Ellipse
 - b) Dashed ellipse
 - c) Rectangle
 - d) Diamond
- 6) Data by itself is not useful unless _____.
 - a) It is massive
 - b) It is processed to obtain information
 - c) It is collected from diverse sources
 - d) It is properly stated

- 7) A relationship is _____.
a) an item in an application
b) a meaningful dependency between entities
c) a collection of related entities
d) related data
- 8) Normalization is a process of restructuring a relation to
a) minimize duplication of data in a database
b) maximize duplication of data to ensure reliability
c) make it of uniform size
d) allow addition of data
- 9) Non-prime attributes cannot be transitively dependent, so the relation must have the _____ normal form.
a) First
b) Second
c) Third
d) Fourth
- 10) There needs to be which of the following conditions for each nontrivial dependency of function X on function Y for a relation to be in third normal form.
a) A super key is X.
b) Every element of Y is a part of some candidate key, i.e, Y is a prime attribute.
c) Either A or B
d) None of the above
- 11) If more than one value of B is present for a single value of A in a dependency $A \rightarrow B$. then the relationship is _____.
a) Single
b) Multi-valued
c) Both a and b
d) None of the above
- 12) What are the ways of dealing with deadlock?
a) Deadlock prevention
b) Deadlock recovery
c) Deadlock detection
d) All of the mentioned
- 13) When transaction T_i requests a data item currently held by T_j , T_i is allowed to wait only if it has a timestamp larger than that of T_j (that is, T_i is younger than T_j). Otherwise, T_j is rolled back (T_j is wounded by T_i). This is _____.
a) Wait-die
b) Wait-wound
c) Wound-wait
d) Wait
- 14) The deadlock in a set of a transaction can be determined by _____.
a) Read-only graph
b) Wait graph
c) Wait-for graph
d) All of the mentioned

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Database Management Systems (BTN04408)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

- Q.2 Solve any Four questions.** **16**
- a) What is DBMS? And what is a purpose of database system?
 - b) Explain cardinality constraints and participating constraints.
 - c) Explain Relational Query languages.
 - d) Explain the basic structure of SQL queries. Also give examples.
 - e) Explain Basic SQL clauses.
- Q.3 Solve any Two questions.** **12**
- a) Which are the types of Database Languages? Explain with its commands.
 - b) Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.
 - c) Explain Extended Relational Algebra operation with example.

Section – II

- Q.4 Solve any Four questions.** **16**
- a) Write a short note on Nested subqueries with example.
 - b) Explain Atomic Domains.
 - c) Explain Index definition in SQL in detail.
 - d) Explain the transaction states with neat diagram.
 - e) Write Features of good Relational Designs.
- Q.5 Solve any Two questions.** **12**
- a) List the different Aggregate operations in SQL? Explain any 3 Aggregate operations with queries.
 - b) Explain in detail B + tree file organization with an example.
 - c) Explain Time stamp ordering protocol with example.

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Set Q

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

ELECTRONICS ENGINEERING

Database Management Systems (BTN04408)

Day & Date: Saturday, 01-06-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if required.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) Normalization is a process of restructuring a relation to
 - a) minimize duplication of data in a database
 - b) maximize duplication of data to ensure reliability
 - c) make it of uniform size
 - d) allow addition of data
- 2) Non-prime attributes cannot be transitively dependent, so the relation must have the _____ normal form.
 - a) First
 - b) Second
 - c) Third
 - d) Fourth
- 3) There needs to be which of the following conditions for each nontrivial dependency of function X on function Y for a relation to be in third normal form.
 - a) A super key is X.
 - b) Every element of Y is a part of some candidate key, i.e, Y is a prime attribute.
 - c) Either A or B
 - d) None of the above
- 4) If more than one value of B is present for a single value of A in a dependency $A \rightarrow B$. then the relationship is _____.
 - a) Single
 - b) Multi-valued
 - c) Both a and b
 - d) None of the above
- 5) What are the ways of dealing with deadlock?
 - a) Deadlock prevention
 - b) Deadlock recovery
 - c) Deadlock detection
 - d) All of the mentioned
- 6) When transaction T_i requests a data item currently held by T_j , T_i is allowed to wait only if it has a timestamp larger than that of T_j (that is, T_i is younger than T_j). Otherwise, T_j is rolled back (T_j is wounded by T_i). This is _____.
 - a) Wait-die
 - b) Wait-wound
 - c) Wound-wait
 - d) Wait

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Database Management Systems (BTN04408)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any Four questions. 16

- a) What is DBMS? And what is a purpose of database system?
- b) Explain cardinality constraints and participating constraints.
- c) Explain Relational Query languages.
- d) Explain the basic structure of SQL queries. Also give examples.
- e) Explain Basic SQL clauses.

Q.3 Solve any Two questions. 12

- a) Which are the types of Database Languages? Explain with its commands.
- b) Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.
- c) Explain Extended Relational Algebra operation with example.

Section – II

Q.4 Solve any Four questions. 16

- a) Write a short note on Nested subqueries with example.
- b) Explain Atomic Domains.
- c) Explain Index definition in SQL in detail.
- d) Explain the transaction states with neat diagram.
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Q.5 Solve any Two questions. 12

- a) List the different Aggregate operations in SQL? Explain any 3 Aggregate operations with queries.
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Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- Page 7 of 12

- 8) The natural join is equal to: _____.
a) Cartesian Product
b) Combination of Union and Cartesian product
c) Combination of selection and Cartesian product
d) Combination of projection and Cartesian product
- 9) In E-R Diagram relationship type is represented by _____.
a) Ellipse
b) Dashed ellipse
c) Rectangle
d) Diamond
- 10) Data by itself is not useful unless _____.
a) It is massive
b) It is processed to obtain information
c) It is collected from diverse sources
d) It is properly stated
- 11) A relationship is _____.
a) an item in an application
b) a meaningful dependency between entities
c) a collection of related entities
d) related data
- 12) Normalization is a process of restructuring a relation to
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Database Management Systems (BTN04408)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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Section – I

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Section – II

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Database Management Systems (BTN04408)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) Data by itself is not useful unless _____.
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 - b) It is processed to obtain information
 - c) It is collected from diverse sources
 - d) It is properly stated
- 2) A relationship is _____.
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 - b) Multi-valued
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 - d) None of the above

- 7) What are the ways of dealing with deadlock?
a) Deadlock prevention b) Deadlock recovery
c) Deadlock detection d) All of the mentioned
- 8) When transaction T_i requests a data item currently held by T_j , T_i is allowed to wait only if it has a timestamp larger than that of T_j (that is, T_i is younger than T_j). Otherwise, T_j is rolled back (T_j is wounded by T_i). This is _____.
a) Wait-die b) Wait-wound
c) Wound-wait d) Wait
- 9) The deadlock in a set of a transaction can be determined by _____.
a) Read-only graph b) Wait graph
c) Wait-for graph d) All of the mentioned
- 10) What database tool would you use to find answers to your questions about data stored in your database?
a) Queries b) Tables
c) Show d) Q&A
- 11) Relational calculus is a _____.
a) Procedural language b) Non- Procedural language
c) Data definition language d) High level language
- 12) Which one of the following statements is false?
a) The data dictionary is normally maintained by the data base administrator
b) Data elements in the database can be modified by changing the data dictionary.
c) The data dictionary contains the name and description of each data element
d) The data dictionary is a tool used exclusively by the database administrator
- 13) The natural join is equal to: _____.
a) Cartesian Product
b) Combination of Union and Cartesian product
c) Combination of selection and Cartesian product
d) Combination of projection and Cartesian product
- 14) In E-R Diagram relationship type is represented by _____.
a) Ellipse b) Dashed ellipse
c) Rectangle d) Diamond

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS ENGINEERING
Database Management Systems (BTN04408)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any Four questions. 16

- a) What is DBMS? And what is a purpose of database system?
- b) Explain cardinality constraints and participating constraints.
- c) Explain Relational Query languages.
- d) Explain the basic structure of SQL queries. Also give examples.
- e) Explain Basic SQL clauses.

Q.3 Solve any Two questions. 12

- a) Which are the types of Database Languages? Explain with its commands.
- b) Construct an E-R diagram for a car-insurance company whose customers own one or more cars each. Each car has associated with it zero to any number of recorded accidents.
- c) Explain Extended Relational Algebra operation with example.

Section – II

Q.4 Solve any Four questions. 16

- a) Write a short note on Nested subqueries with example.
- b) Explain Atomic Domains.
- c) Explain Index definition in SQL in detail.
- d) Explain the transaction states with neat diagram.
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Q.5 Solve any Two questions. 12

- a) List the different Aggregate operations in SQL? Explain any 3 Aggregate operations with queries.
- b) Explain in detail B + tree file organization with an example.
- c) Explain Time stamp ordering protocol with example.

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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
ELECTRONIC ENGINEERING
Fundamentals of IOT (BTN04409)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) In the context of IoT, what does the term edge computing refer to?
 - a) Cloud-based processing
 - b) Real-time processing on the device
 - c) Communication between devices
 - d) Application development
- 2) Which of the following is NOT a component of an IoT system?
 - a) Embedded system
 - b) Communication protocol
 - c) Blockchain
 - d) Cloud
- 3) Which component of an embedded system is responsible for data storage and processing?
 - a) Cloud
 - b) Input/Output interfaces
 - c) Communication system
 - d) Applications
- 4) What is the significance of using Linux in embedded systems for IoT?
 - a) Linux enhances real-time processing.
 - b) Linux is the only operating system compatible with embedded systems.
 - c) Linux simplifies the development process.
 - d) Linux is not suitable for embedded systems.
- 5) Which of the following is a key component of an embedded system?
 - a) Cloud
 - b) Input/Output interfaces
 - c) Communication system
 - d) Applications
- 6) What are the key characteristics of sensors?
 - a) Size and weight
 - b) Sensitivity, accuracy, precision, and resolution
 - c) Color and shape
 - d) Operating temperature
- 7) What does the term signal conditioning refer to in the context of sensors?
 - a) Adjusting sensor readings to match a reference standard
 - b) Enhancing sensor sensitivity
 - c) Preprocessing and modifying the sensor signal
 - d) Improving sensor communication range

- 8) What is the role of velocity and acceleration sensors in IoT applications?
- a) Measuring speed and changes in speed
 - b) Detecting light intensity
 - c) Monitoring environmental noise
 - d) Assessing humidity levels
- 9) What is sensor fusion in the context of IoT?
- a) Combining data from multiple sensors to enhance accuracy
 - b) Reducing sensor sensitivity
 - c) Enhancing communication between sensors
 - d) Increasing power consumption in sensors
- 10) What are the applications of light detectors in IoT?
- a) Monitoring temperature
 - b) Adjusting ambient light
 - c) Measuring humidity levels
 - d) Tracking asset positions
- 11) In which scenario would RFID be a suitable communication technology for IoT devices?
- a) Short-range communication in a smart home
 - b) Real-time data transfer in industrial automation
 - c) Asset tracking in a warehouse
 - d) Monitoring health parameters in healthcare applications
- 12) What is a characteristic feature of Zigbee technology in IoT applications?
- a) High power consumption
 - b) Short communication range
 - c) High data transfer speed
 - d) Mesh networking capability
- 13) Which directory in the Raspberry Pi file system stores boot-related files?
- a) /bin
 - b) /etc
 - c) /boot
 - d) /home
- 14) What is the first step after installing Raspbian on a Raspberry Pi for initial configuration.
- a) Setting up Wi-Fi
 - b) Changing the default password
 - c) Configuring GPIO pins
 - d) Installing Python

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
ELECTRONIC ENGINEERING
Fundamentals of IOT (BTN04409)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All Questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four. **16**

- a) Compare different communication protocols used in IoT devices and discuss their strengths and weaknesses.
- b) Explain the role of cloud computing in supporting IoT applications. How does cloud computing enhance the capabilities of IoT devices?
- c) Compare various embedded platforms commonly used in IoT.
- d) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- e) Explain the units of measurement commonly used in sensor technology.

Q.3 Attempt any Two. **12**

- a) Explain the concept of edge computing in the context of IoT. How does edge computing address the challenges of data processing and latency in IoT systems? Provide examples of edge computing in IoT applications.
- b) Explain the significance of integrated development environments (IDEs) in embedded development. Discuss different IDEs used for embedded systems and their features, emphasizing their role in simplifying the development process.
- c) Examine the concept of noise in sensor signals. Discuss the types of noise that can affect sensor measurements and explain how noise can be minimized or eliminated in sensor systems.

Section – II

Q.4 Attempt any Four. **16**

- a) Discuss the significance of humidity and moisture sensors in IoT.
- b) Discuss how light sensors are used for tasks such as ambient light adjustment, security, and in consumer electronics.
- c) Discuss the challenges and considerations in implementing sensor applications in real-world scenarios.
- d) Compare Bluetooth Low Energy (BLE), WiFi, and RFID technologies.
- e) Identify two significant challenges in developing IoT solutions with Raspberry Pi and discuss potential future advancements in this field.

Q.5 Attempt any Two.

- a)** Discuss the techniques and protocols used for interfacing LED, switches, and LCD with Raspberry Pi.
- b)** Examine the integration of communication technologies in industrial IoT applications. Discuss how BLE, WiFi, and RFID are employed to enable communication between machines and support automation in industrial settings.
- c)** Discuss the role of temperature sensors in various IoT applications. Discuss examples of temperature-sensitive applications in industries such as healthcare, food storage, and climate control.

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Set Q

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
ELECTRONIC ENGINEERING
Fundamentals of IOT (BTN04409)

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) What is the role of velocity and acceleration sensors in IoT applications?
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- 13) What are the key characteristics of sensors?
- a) Size and weight
 - b) Sensitivity, accuracy, precision, and resolution
 - c) Color and shape
 - d) Operating temperature
- 14) What does the term signal conditioning refer to in the context of sensors?
- a) Adjusting sensor readings to match a reference standard
 - b) Enhancing sensor sensitivity
 - c) Preprocessing and modifying the sensor signal
 - d) Improving sensor communication range

Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
ELECTRONIC ENGINEERING
Fundamentals of IOT (BTN04409)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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Section – I

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- d) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- e) Explain the units of measurement commonly used in sensor technology.

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- a) Explain the concept of edge computing in the context of IoT. How does edge computing address the challenges of data processing and latency in IoT systems? Provide examples of edge computing in IoT applications.
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Section – II

Q.4 Attempt any Four. **16**

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Seat No.	
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
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Fundamentals of IOT (BTN04409)

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

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- 1) In which scenario would RFID be a suitable communication technology for IoT devices?
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 - c) Asset tracking in a warehouse
 - d) Monitoring health parameters in healthcare applications
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 - c) Blockchain
 - d) Cloud
- 7) Which component of an embedded system is responsible for data storage and processing?
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- 12) What is the role of velocity and acceleration sensors in IoT applications?
- a) Measuring speed and changes in speed
 - b) Detecting light intensity
 - c) Monitoring environmental noise
 - d) Assessing humidity levels
- 13) What is sensor fusion in the context of IoT?
- a) Combining data from multiple sensors to enhance accuracy
 - b) Reducing sensor sensitivity
 - c) Enhancing communication between sensors
 - d) Increasing power consumption in sensors
- 14) What are the applications of light detectors in IoT?
- a) Monitoring temperature
 - b) Adjusting ambient light
 - c) Measuring humidity levels
 - d) Tracking asset positions

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
ELECTRONIC ENGINEERING
Fundamentals of IOT (BTN04409)

Day & Date: Saturday, 01-06-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All Questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four. **16**

- a) Compare different communication protocols used in IoT devices and discuss their strengths and weaknesses.
- b) Explain the role of cloud computing in supporting IoT applications. How does cloud computing enhance the capabilities of IoT devices?
- c) Compare various embedded platforms commonly used in IoT.
- d) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- e) Explain the units of measurement commonly used in sensor technology.

Q.3 Attempt any Two. **12**

- a) Explain the concept of edge computing in the context of IoT. How does edge computing address the challenges of data processing and latency in IoT systems? Provide examples of edge computing in IoT applications.
- b) Explain the significance of integrated development environments (IDEs) in embedded development. Discuss different IDEs used for embedded systems and their features, emphasizing their role in simplifying the development process.
- c) Examine the concept of noise in sensor signals. Discuss the types of noise that can affect sensor measurements and explain how noise can be minimized or eliminated in sensor systems.

Section – II

Q.4 Attempt any Four. **16**

- a) Discuss the significance of humidity and moisture sensors in IoT.
- b) Discuss how light sensors are used for tasks such as ambient light adjustment, security, and in consumer electronics.
- c) Discuss the challenges and considerations in implementing sensor applications in real-world scenarios.
- d) Compare Bluetooth Low Energy (BLE), WiFi, and RFID technologies.
- e) Identify two significant challenges in developing IoT solutions with Raspberry Pi and discuss potential future advancements in this field.

Q.5 Attempt any Two.

- a)** Discuss the techniques and protocols used for interfacing LED, switches, and LCD with Raspberry Pi.
- b)** Examine the integration of communication technologies in industrial IoT applications. Discuss how BLE, WiFi, and RFID are employed to enable communication between machines and support automation in industrial settings.
- c)** Discuss the role of temperature sensors in various IoT applications. Discuss examples of temperature-sensitive applications in industries such as healthcare, food storage, and climate control.

Seat No.	
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Set	S
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S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
ELECTRONIC ENGINEERING
Fundamentals of IOT (BTN04409)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) What are the key characteristics of sensors?
 - a) Size and weight
 - b) Sensitivity, accuracy, precision, and resolution
 - c) Color and shape
 - d) Operating temperature
- 2) What does the term signal conditioning refer to in the context of sensors?
 - a) Adjusting sensor readings to match a reference standard
 - b) Enhancing sensor sensitivity
 - c) Preprocessing and modifying the sensor signal
 - d) Improving sensor communication range
- 3) What is the role of velocity and acceleration sensors in IoT applications?
 - a) Measuring speed and changes in speed
 - b) Detecting light intensity
 - c) Monitoring environmental noise
 - d) Assessing humidity levels
- 4) What is sensor fusion in the context of IoT?
 - a) Combining data from multiple sensors to enhance accuracy
 - b) Reducing sensor sensitivity
 - c) Enhancing communication between sensors
 - d) Increasing power consumption in sensors
- 5) What are the applications of light detectors in IoT?
 - a) Monitoring temperature
 - b) Adjusting ambient light
 - c) Measuring humidity levels
 - d) Tracking asset positions
- 6) In which scenario would RFID be a suitable communication technology for IoT devices?
 - a) Short-range communication in a smart home
 - b) Real-time data transfer in industrial automation
 - c) Asset tracking in a warehouse
 - d) Monitoring health parameters in healthcare applications

- 7) What is a characteristic feature of Zigbee technology in IoT applications?
- a) High power consumption
 - b) Short communication range
 - c) High data transfer speed
 - d) Mesh networking capability
- 8) Which directory in the Raspberry Pi file system stores boot-related files?
- a) /bin
 - b) /etc
 - c) /boot
 - d) /home
- 9) What is the first step after installing Raspbian on a Raspberry Pi for initial configuration.
- a) Setting up Wi-Fi
 - b) Changing the default password
 - c) Configuring GPIO pins
 - d) Installing Python
- 10) In the context of IoT, what does the term edge computing refer to?
- a) Cloud-based processing
 - b) Real-time processing on the device
 - c) Communication between devices
 - d) Application development
- 11) Which of the following is NOT a component of an IoT system?
- a) Embedded system
 - b) Communication protocol
 - c) Blockchain
 - d) Cloud
- 12) Which component of an embedded system is responsible for data storage and processing?
- a) Cloud
 - b) Input/Output interfaces
 - c) Communication system
 - d) Applications
- 13) What is the significance of using Linux in embedded systems for IoT?
- a) Linux enhances real-time processing.
 - b) Linux is the only operating system compatible with embedded systems.
 - c) Linux simplifies the development process.
 - d) Linux is not suitable for embedded systems.
- 14) Which of the following is a key component of an embedded system?
- a) Cloud
 - b) Input/Output interfaces
 - c) Communication system
 - d) Applications

Seat No.	
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Set S

S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024
ELECTRONIC ENGINEERING
Fundamentals of IOT (BTN04409)

Day & Date: Saturday, 01-06-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All Questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four. **16**

- a) Compare different communication protocols used in IoT devices and discuss their strengths and weaknesses.
- b) Explain the role of cloud computing in supporting IoT applications. How does cloud computing enhance the capabilities of IoT devices?
- c) Compare various embedded platforms commonly used in IoT.
- d) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- e) Explain the units of measurement commonly used in sensor technology.

Q.3 Attempt any Two. **12**

- a) Explain the concept of edge computing in the context of IoT. How does edge computing address the challenges of data processing and latency in IoT systems? Provide examples of edge computing in IoT applications.
- b) Explain the significance of integrated development environments (IDEs) in embedded development. Discuss different IDEs used for embedded systems and their features, emphasizing their role in simplifying the development process.
- c) Examine the concept of noise in sensor signals. Discuss the types of noise that can affect sensor measurements and explain how noise can be minimized or eliminated in sensor systems.

Section – II

Q.4 Attempt any Four. **16**

- a) Discuss the significance of humidity and moisture sensors in IoT.
- b) Discuss how light sensors are used for tasks such as ambient light adjustment, security, and in consumer electronics.
- c) Discuss the challenges and considerations in implementing sensor applications in real-world scenarios.
- d) Compare Bluetooth Low Energy (BLE), WiFi, and RFID technologies.
- e) Identify two significant challenges in developing IoT solutions with Raspberry Pi and discuss potential future advancements in this field.

Q.5 Attempt any Two.

- a)** Discuss the techniques and protocols used for interfacing LED, switches, and LCD with Raspberry Pi.
- b)** Examine the integration of communication technologies in industrial IoT applications. Discuss how BLE, WiFi, and RFID are employed to enable communication between machines and support automation in industrial settings.
- c)** Discuss the role of temperature sensors in various IoT applications. Discuss examples of temperature-sensitive applications in industries such as healthcare, food storage, and climate control.

Seat No.	
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – I (BTN03301)

Day & Date: Monday, 13-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.

3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct option.

14

- 1) The solution of $\frac{d^3y}{dx^3} - 4\frac{dy}{dx} = 0$ is _____.
 - a) $c_1 = c_2e^{2x} + c_3e^{-2x}$
 - b) $c_1 = (c_2 + c_3x)e^{2x}$
 - c) $c_1e^x + c_2e^{2x} + c_3e^{-2x}$
 - d) $(c_1 + c_2x + c_3x^2)e^{2x}$
- 2) The particular integral of $(D^3 + D)y = \cos x$ is _____.
 - a) $\frac{x}{2}\cos x$
 - b) $-\frac{x}{2}\cos x$
 - c) $\frac{x}{2}\sin x$
 - d) $-\frac{x}{2}\sin x$
- 3) The value of the integral $\int_0^\infty e^{-3t} \cos t \, dt$ is _____.
 - a) $\frac{3}{10}$
 - b) $-\frac{3}{10}$
 - c) 3
 - d) 10
- 4) The Laplace transform of t^2e^{-2t} is _____.
 - a) $\frac{-2}{(s+2)^3}$
 - b) $\frac{1}{(s+2)^3}$
 - c) $\frac{2}{(s+2)^2}$
 - d) $\frac{1}{(s+2)^2}$
- 5) $L^{-1}\left\{\frac{1}{(s-3)^2}\right\} =$ _____.
 - a) te^{3t}
 - b) te^{-3t}
 - c) $\frac{1}{t}e^{-3t}$
 - d) te^{3t}
- 6) If $\{f(k)\} = 3^k, k \geq 0$ then its z-transform is _____.
 - a) $\frac{1}{z-3}$
 - b) $z(z-3)$
 - c) $\frac{z}{z-3}$
 - d) $\frac{z-3}{z}$ with the condition $\left|\frac{z}{3}\right| < 1$

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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – I (BTN03301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any Three of the following. **09**

- Solve $(D^2 - 1)y = (1 + e^{-x})^2$
- Solve $(D^3 - D^2 - 6D)y = x^2 + 1$
- Find $L\left\{\frac{1}{t}(1 - \cos t)\right\}$
- Find the inverse Laplace transform of $\frac{s+29}{(s+4)(s^2+9)}$
- Find $Z\{ke^{-ak}\}, k \geq 0$

Q.3 Solve any Three of the following. **09**

- Solve $(D^2 - 4D + 4)y = e^{2x} \sin 3x$.
- Find $Z\{e^{-3k} \sin 2k\}, k \geq 0$
- find $L\left\{e^{-3t} \int_0^t u \sin 3u du\right\}$
- Find Z-Transform of $f(k) = \begin{cases} 4^k, & k < 0 \\ 3^k, & k \geq 0 \end{cases}$
- Find $L^{-1}\left\{\log\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$

Q.4 Solve any Two of the following. **10**

- Solve $(D^2 - 3D + 2)y = e^{-2x} \sec^2 x (1 + 2 \tan x)$
- Using Laplace transform method solve $y''(t) - 2y'(t) + y(t) = e^t$, with $y(0) = 2$ and $y'(0) = -1$
- Calculate inverse Z-transform of $F(z) = \frac{z^2}{(z-1/4)(z-1/5)}$, if ROC is $1/5 < |z| < 1/4$

Section – II

Q.5 Solve any Three of the following.**09**

- a) Obtain half range sine series of e^{ax} in $(0, \pi)$.
- b) The equations of the two lines of regression are $6y = 5x + 90$ and $15x = 8y + 130$. Find the means of x and y and coefficient of correlation.
- c) The following table gives the number of motor vehicles with licenses and the number of motor vehicle accidents in a city. Calculate the coefficient of correlation between the number of motor vehicles and number of motor vehicle accidents.

No. of vehicles (in thousands)	2.6	2.8	2.9	3.1	3.2	2.3	2.5	1.8
No. of accidents (in Hundreds)	5.9	6.0	6.2	6.2	7.6	7.0	7.5	5.5

- d) Obtain Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$
- e) With usual notation find the average waiting time per customer in the queue and in the system for $M/M/1/\infty$ model, if $\lambda = 9$ and $\mu = 15$ per hour.

Q.6 Solve any Three of the following.**09**

- a) Obtain half range cosine series of $f(x) = x - x^2$ in $0 \leq x \leq 1$
- b) Determine what is the probability that out of 10 men, now 60, at least 8 would live up to 70? The probability that a man aged 60 will live up to 70 is 0.65.
- c) Determine the probability that a student selected at random will have weight
- less than 45 kilograms
 - between 45 and 60 kilograms, if the weights of 4000 students are found to be normally distributed with mean 50 kilograms and standard deviation 5 kilograms.
(For a standard normal variate z , area under the curve between $z = 0$ and $z = 1$ is 0.3413 and that between $z = 0$ and $z = 2$ is 0.4772)
- d) An xerox machine owner earns by giving xeroxing service. The time required to complete xeroxing of one customer has an exponential distribution with mean of 5 minutes. The arrival of customers is a Poisson process with mean rate of 6 customers an hour. If the machine owner works 8 hours a day, find
- the percentage idle time
 - the average time a customer has to remain in the shop.
- e) Fit a Poisson's distribution to the following data:

X	0	1	2	3	4	Total
f	192	100	24	3	1	320

Q.7 Solve any Two of the following.

- a) Calculate the two lines of regression and estimate the weight of the student of height 59 inches. The following data give the heights in inches (x) and the weights in lbs. (y) of random sample of 10 students from a large group of students of age 17 years.

x	61	68	68	64	65	70	63	62	64	77
y	112	123	130	115	110	125	100	113	116	126

- b) Obtain Fourier series expansion of $f(x) = \begin{cases} x, & 0 < x \leq \pi \\ 2\pi - x, & \pi < x \leq 2\pi \end{cases}$
- c) A super market has two girls at the sales counter. If the service time for each customer is exponentially distributed with mean of 4 minutes and if the arrival time is Poisson with mean rate 10 per hour, find
- the probability that a customer has to wait.
 - expected idle time for each girl.

Seat No.	
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Set

Q

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – I (BTN03301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct option.**14**

- 1) Which of the following is not a Dirichlet's condition?

a) $f(x)$ is periodic	b) $f(x)$ is single valued
c) $f(x)$ is even function	d) $f(x)$ is infinite
- 2) If $f(x) = x^2$ expanded as cosine series in $(0, \pi)$ then the constant term is _____.

a) $\frac{\pi^2}{3}$	b) $\frac{\pi^3}{3}$
c) $\frac{2\pi^2}{3}$	d) $\frac{3\pi^2}{2}$
- 3) Correlation analysis help us to _____ our activities.

a) Control	b) Plan
c) Predict	d) All of above
- 4) If the probability of defective bulbs is 0.2, then the variance of the distribution of defective bulbs in a lot of 1000 bulbs is _____.

a) 200	b) 1600
c) 1000	d) 160
- 5) A discrete probability distribution function of a discrete random variable is given by _____.

$x:$	1	2	3	4	5	6
$P(x):$	k	$2k$	$3k$	k^2	$K^2 + k$	$4k^2$

a) $1/5$	b) $1/8$
c) $1/7$	d) $1/6$
- 6) If λ is the arrival rate and μ is the service rate then utilisation factor is given by _____.

a) $\frac{\mu}{\lambda}$	b) $\frac{\lambda}{\mu}$
c) $\frac{\lambda^2}{\mu}$	d) $1 - \frac{\mu}{\lambda}$

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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – I (BTN03301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any Three of the following. **09**

- Solve $(D^2 - 1)y = (1 + e^{-x})^2$
- Solve $(D^3 - D^2 - 6D)y = x^2 + 1$
- Find $L\left\{\frac{1}{t}(1 - \cos t)\right\}$
- Find the inverse Laplace transform of $\frac{s+29}{(s+4)(s^2+9)}$
- Find $Z\{ke^{-ak}\}, k \geq 0$

Q.3 Solve any Three of the following. **09**

- Solve $(D^2 - 4D + 4)y = e^{2x} \sin 3x$.
- Find $Z\{e^{-3k} \sin 2k\}, k \geq 0$
- find $L\left\{e^{-3t} \int_0^t u \sin 3u du\right\}$
- Find Z-Transform of $f(k) = \begin{cases} 4^k, & k < 0 \\ 3^k, & k \geq 0 \end{cases}$
- Find $L^{-1}\left\{\log\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$

Q.4 Solve any Two of the following. **10**

- Solve $(D^2 - 3D + 2)y = e^{-2x} \sec^2 x (1 + 2 \tan x)$
- Using Laplace transform method solve $y''(t) - 2y'(t) + y(t) = e^t$, with $y(0) = 2$ and $y'(0) = -1$
- Calculate inverse Z-transform of $F(z) = \frac{z^2}{(z-1/4)(z-1/5)}$, if ROC is $1/5 < |z| < 1/4$

Section – II

Q.5 Solve any Three of the following.**09**

- a) Obtain half range sine series of e^{ax} in $(0, \pi)$.
- b) The equations of the two lines of regression are $6y = 5x + 90$ and $15x = 8y + 130$. Find the means of x and y and coefficient of correlation.
- c) The following table gives the number of motor vehicles with licenses and the number of motor vehicle accidents in a city. Calculate the coefficient of correlation between the number of motor vehicles and number of motor vehicle accidents.

No. of vehicles (in thousands)	2.6	2.8	2.9	3.1	3.2	2.3	2.5	1.8
No. of accidents (in Hundreds)	5.9	6.0	6.2	6.2	7.6	7.0	7.5	5.5

- d) Obtain Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$
- e) With usual notation find the average waiting time per customer in the queue and in the system for $M/M/1/\infty$ model, if $\lambda = 9$ and $\mu = 15$ per hour.

Q.6 Solve any Three of the following.**09**

- a) Obtain half range cosine series of $f(x) = x - x^2$ in $0 \leq x \leq 1$
- b) Determine what is the probability that out of 10 men, now 60, at least 8 would live up to 70? The probability that a man aged 60 will live up to 70 is 0.65.
- c) Determine the probability that a student selected at random will have weight
- less than 45 kilograms
 - between 45 and 60 kilograms, if the weights of 4000 students are found to be normally distributed with mean 50 kilograms and standard deviation 5 kilograms.
(For a standard normal variate z , area under the curve between $z = 0$ and $z = 1$ is 0.3413 and that between $z = 0$ and $z = 2$ is 0.4772)
- d) An xerox machine owner earns by giving xeroxing service. The time required to complete xeroxing of one customer has an exponential distribution with mean of 5 minutes. The arrival of customers is a Poisson process with mean rate of 6 customers an hour. If the machine owner works 8 hours a day, find
- the percentage idle time
 - the average time a customer has to remain in the shop.
- e) Fit a Poisson's distribution to the following data:

X	0	1	2	3	4	Total
f	192	100	24	3	1	320

Q.7 Solve any Two of the following.

- a) Calculate the two lines of regression and estimate the weight of the student of height 59 inches. The following data give the heights in inches (x) and the weights in lbs. (y) of random sample of 10 students from a large group of students of age 17 years.

x	61	68	68	64	65	70	63	62	64	77
y	112	123	130	115	110	125	100	113	116	126

- b) Obtain Fourier series expansion of $f(x) = \begin{cases} x, & 0 < x \leq \pi \\ 2\pi - x, & \pi < x \leq 2\pi \end{cases}$
- c) A super market has two girls at the sales counter. If the service time for each customer is exponentially distributed with mean of 4 minutes and if the arrival time is Poisson with mean rate 10 per hour, find
- the probability that a customer has to wait.
 - expected idle time for each girl.

Seat No.	
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- 7) The value of the integral $\int_0^\infty e^{-3t} \cos t \, dt$ is _____.
 a) $\frac{3}{10}$ b) $-\frac{3}{10}$
 c) 3 d) 10
- 8) The Laplace transform of $t^2 e^{-2t}$ is _____.
 a) $\frac{-2}{(s+2)^3}$ b) $\frac{1}{(s+2)^3}$
 c) $\frac{2}{(s+2)^2}$ d) $\frac{1}{(s+2)^2}$
- 9) $L^{-1}\left\{\frac{1}{(s-3)^2}\right\} =$ _____.
 a) te^{3t} b) te^{-3t}
 c) $\frac{1}{t}e^{-3t}$ d) te^{3t}
- 10) If $\{f(k)\} = 3^k, k \geq 0$ then its z-transform is _____.
 a) $\frac{1}{z-3}$ b) $z(z-3)$
 c) $\frac{z}{z-3}$ d) $\frac{z-3}{z}$ with the condition $\left|\frac{z}{3}\right| < 1$
- 11) If $U(k) = \begin{cases} 1, & k \geq 0 \\ 0, & k < 0 \end{cases}$ then $Z\{U(k)\} =$ _____.
 a) $\frac{1}{z-1}$ b) $\frac{z}{z-1}$
 c) $-\frac{1}{z-1}$ d) $-\frac{z}{z-1}$
- 12) Which of the following is not a Dirichlet's condition?
 a) $f(x)$ is periodic b) $f(x)$ is single valued
 c) $f(x)$ is even function d) $f(x)$ is infinite
- 13) If $f(x) = x^2$ expanded as cosine series in $(0, \pi)$ then the constant term is _____.
 a) $\frac{\pi^2}{3}$ b) $\frac{\pi^3}{3}$
 c) $\frac{2\pi^2}{3}$ d) $\frac{3\pi^2}{2}$
- 14) Correlation analysis help us to _____ our activities.
 a) Control b) Plan
 c) Predict d) All of above

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – I (BTN03301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any Three of the following. **09**

- Solve $(D^2 - 1)y = (1 + e^{-x})^2$
- Solve $(D^3 - D^2 - 6D)y = x^2 + 1$
- Find $L\left\{\frac{1}{t}(1 - \cos t)\right\}$
- Find the inverse Laplace transform of $\frac{s+29}{(s+4)(s^2+9)}$
- Find $Z\{ke^{-ak}\}, k \geq 0$

Q.3 Solve any Three of the following. **09**

- Solve $(D^2 - 4D + 4)y = e^{2x} \sin 3x$.
- Find $Z\{e^{-3k} \sin 2k\}, k \geq 0$
- find $L\left\{e^{-3t} \int_0^t u \sin 3u du\right\}$
- Find Z-Transform of $f(k) = \begin{cases} 4^k, & k < 0 \\ 3^k, & k \geq 0 \end{cases}$
- Find $L^{-1}\left\{\log\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$

Q.4 Solve any Two of the following. **10**

- Solve $(D^2 - 3D + 2)y = e^{-2x} \sec^2 x (1 + 2 \tan x)$
- Using Laplace transform method solve $y''(t) - 2y'(t) + y(t) = e^t$, with $y(0) = 2$ and $y'(0) = -1$
- Calculate inverse Z-transform of $F(z) = \frac{z^2}{(z-1/4)(z-1/5)}$, if ROC is $1/5 < |z| < 1/4$

Section – II

Q.5 Solve any Three of the following.**09**

- a) Obtain half range sine series of e^{ax} in $(0, \pi)$.
- b) The equations of the two lines of regression are $6y = 5x + 90$ and $15x = 8y + 130$. Find the means of x and y and coefficient of correlation.
- c) The following table gives the number of motor vehicles with licenses and the number of motor vehicle accidents in a city. Calculate the coefficient of correlation between the number of motor vehicles and number of motor vehicle accidents.

No. of vehicles (in thousands)	2.6	2.8	2.9	3.1	3.2	2.3	2.5	1.8
No. of accidents (in Hundreds)	5.9	6.0	6.2	6.2	7.6	7.0	7.5	5.5

- d) Obtain Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$
- e) With usual notation find the average waiting time per customer in the queue and in the system for $M/M/1/\infty$ model, if $\lambda = 9$ and $\mu = 15$ per hour.

Q.6 Solve any Three of the following.**09**

- a) Obtain half range cosine series of $f(x) = x - x^2$ in $0 \leq x \leq 1$
- b) Determine what is the probability that out of 10 men, now 60, at least 8 would live up to 70? The probability that a man aged 60 will live up to 70 is 0.65.
- c) Determine the probability that a student selected at random will have weight
- less than 45 kilograms
 - between 45 and 60 kilograms, if the weights of 4000 students are found to be normally distributed with mean 50 kilograms and standard deviation 5 kilograms.
(For a standard normal variate z , area under the curve between $z = 0$ and $z = 1$ is 0.3413 and that between $z = 0$ and $z = 2$ is 0.4772)
- d) An xerox machine owner earns by giving xeroxing service. The time required to complete xeroxing of one customer has an exponential distribution with mean of 5 minutes. The arrival of customers is a Poisson process with mean rate of 6 customers an hour. If the machine owner works 8 hours a day, find
- the percentage idle time
 - the average time a customer has to remain in the shop.
- e) Fit a Poisson's distribution to the following data:

X	0	1	2	3	4	Total
f	192	100	24	3	1	320

Q.7 Solve any Two of the following.

- a) Calculate the two lines of regression and estimate the weight of the student of height 59 inches. The following data give the heights in inches (x) and the weights in lbs. (y) of random sample of 10 students from a large group of students of age 17 years.

x	61	68	68	64	65	70	63	62	64	77
y	112	123	130	115	110	125	100	113	116	126

- b) Obtain Fourier series expansion of $f(x) = \begin{cases} x, & 0 < x \leq \pi \\ 2\pi - x, & \pi < x \leq 2\pi \end{cases}$
- c) A super market has two girls at the sales counter. If the service time for each customer is exponentially distributed with mean of 4 minutes and if the arrival time is Poisson with mean rate 10 per hour, find
- the probability that a customer has to wait.
 - expected idle time for each girl.

Seat No.	
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Day & Date: Monday, 13-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.

Marks:14

14

- Page 16 of 20

- Page 17 of 20

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – I (BTN03301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Solve any Three of the following. **09**

- Solve $(D^2 - 1)y = (1 + e^{-x})^2$
- Solve $(D^3 - D^2 - 6D)y = x^2 + 1$
- Find $L\left\{\frac{1}{t}(1 - \cos t)\right\}$
- Find the inverse Laplace transform of $\frac{s+29}{(s+4)(s^2+9)}$
- Find $Z\{ke^{-ak}\}, k \geq 0$

Q.3 Solve any Three of the following. **09**

- Solve $(D^2 - 4D + 4)y = e^{2x} \sin 3x$.
- Find $Z\{e^{-3k} \sin 2k\}, k \geq 0$
- find $L\left\{e^{-3t} \int_0^t u \sin 3u du\right\}$
- Find Z-Transform of $f(k) = \begin{cases} 4^k, & k < 0 \\ 3^k, & k \geq 0 \end{cases}$
- Find $L^{-1}\left\{\log\left(\frac{s^2+a^2}{s^2+b^2}\right)\right\}$

Q.4 Solve any Two of the following. **10**

- Solve $(D^2 - 3D + 2)y = e^{-2x} \sec^2 x (1 + 2 \tan x)$
- Using Laplace transform method solve $y''(t) - 2y'(t) + y(t) = e^t$, with $y(0) = 2$ and $y'(0) = -1$
- Calculate inverse Z-transform of $F(z) = \frac{z^2}{(z-1/4)(z-1/5)}$, if ROC is $1/5 < |z| < 1/4$

Section – II

Q.5 Solve any Three of the following.**09**

- a) Obtain half range sine series of e^{ax} in $(0, \pi)$.
- b) The equations of the two lines of regression are $6y = 5x + 90$ and $15x = 8y + 130$. Find the means of x and y and coefficient of correlation.
- c) The following table gives the number of motor vehicles with licenses and the number of motor vehicle accidents in a city. Calculate the coefficient of correlation between the number of motor vehicles and number of motor vehicle accidents.

No. of vehicles (in thousands)	2.6	2.8	2.9	3.1	3.2	2.3	2.5	1.8
No. of accidents (in Hundreds)	5.9	6.0	6.2	6.2	7.6	7.0	7.5	5.5

- d) Obtain Fourier series expansion of $f(x) = x^2$ in $(-\pi, \pi)$
- e) With usual notation find the average waiting time per customer in the queue and in the system for $M/M/1/\infty$ model, if $\lambda = 9$ and $\mu = 15$ per hour.

Q.6 Solve any Three of the following.**09**

- a) Obtain half range cosine series of $f(x) = x - x^2$ in $0 \leq x \leq 1$
- b) Determine what is the probability that out of 10 men, now 60, at least 8 would live up to 70? The probability that a man aged 60 will live up to 70 is 0.65.
- c) Determine the probability that a student selected at random will have weight
- less than 45 kilograms
 - between 45 and 60 kilograms, if the weights of 4000 students are found to be normally distributed with mean 50 kilograms and standard deviation 5 kilograms.
(For a standard normal variate z , area under the curve between $z = 0$ and $z = 1$ is 0.3413 and that between $z = 0$ and $z = 2$ is 0.4772)
- d) An xerox machine owner earns by giving xeroxing service. The time required to complete xeroxing of one customer has an exponential distribution with mean of 5 minutes. The arrival of customers is a Poisson process with mean rate of 6 customers an hour. If the machine owner works 8 hours a day, find
- the percentage idle time
 - the average time a customer has to remain in the shop.
- e) Fit a Poisson's distribution to the following data:

X	0	1	2	3	4	Total
f	192	100	24	3	1	320

Q.7 Solve any Two of the following.

- a) Calculate the two lines of regression and estimate the weight of the student of height 59 inches. The following data give the heights in inches (x) and the weights in lbs. (y) of random sample of 10 students from a large group of students of age 17 years.

x	61	68	68	64	65	70	63	62	64	77
y	112	123	130	115	110	125	100	113	116	126

- b) Obtain Fourier series expansion of $f(x) = \begin{cases} x, & 0 < x \leq \pi \\ 2\pi - x, & \pi < x \leq 2\pi \end{cases}$
- c) A super market has two girls at the sales counter. If the service time for each customer is exponentially distributed with mean of 4 minutes and if the arrival time is Poisson with mean rate 10 per hour, find
- the probability that a customer has to wait.
 - expected idle time for each girl.

Seat No.	
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Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

- Instructions:**
- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 - 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 - 3) Figures to the right indicates full marks.
 - 4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) A Poset in which every pair of elements has both a least upper bound and a greatest lower bound is termed as _____.
a) sublattice
b) lattice
c) trail
d) walk
- 2) A _____ has a greatest element and a least element which satisfy $0 \leq a \leq 1$ for every a in the lattice (say, L).
a) semilattice
b) join semilattice
c) meet semilattice
d) bounded lattice
- 3) An algebraic structure _____ is called a semigroup.
a) $(P, *)$
b) $(Q, +, *)$
c) $(P, +)$
d) $(+, *)$
- 4) Condition for monoid is _____.
a) $(a + e) = a$
b) $(a * e) = (a + e)$
c) $a = (a * (a + e))$
d) $(a * e) = (e * a) = a$
- 5) How many properties can be held by a group?
a) 2
b) 3
c) 5
d) 4
- 6) A bijection is a function which is many-one and onto.
a) True
b) False
- 7) A mapping $f: X \rightarrow Y$ is one if _____.
a) $f(x_1) \neq f(x_2)$ for all x_1, x_2 in X
b) If $f(x_1) = f(x_2)$ then $x_1 = x_2$ for all x_1, x_2 in X
c) $f(x_1) = f(x_2)$ for all x_1, x_2 in X
d) None of the mentioned
- 8) The inverse of function $f(x) = x^3 + 2$ is _____.
a) $f^{-1}(y) = (y - 2)^{1/3}$
b) $f^{-1}(y) = (y - 2)^{1/3}$
c) $f^{-1}(y) = (y)^{1/3}$
d) $f^{-1}(y) = (y - 2)$

- 9) What is the Cartesian product of $A = \{1, 2\}$ and $B = \{a, b\}$?
- a) $\{(1, a), (1, b), (2, a), (b, b)\}$ b) $\{(1,1), (2, 2), (a, a), (b, b)\}$
c) $\{(1, a), (2, a), (1, b), (2, b)\}$ d) $\{(1,1), (a, a), (2, a), (1, b)\}$
- 10) The set O of odd positive integers less than 10 can be expressed by ____.
- a) $\{1,2,3\}$ b) $\{13,5,7,9\}$
c) $\{1,2,5,9\}$ d) $\{1,5,7,9,11\}$
- 11) What is the Cartesian product of $A = \{1, 2\}$ and $B = \{a, b\}$?
- a) $\{(1, a), (1, b), (2, a), (b, b)\}$ b) $\{(1, 1), (2, 2), (a, a), (b, b)\}$
c) $\{(1, a), (2, a), (1, b), (2, b)\}$ d) $\{(1,1), (a, a), (2, a), (1, b)\}$
- 12) What is the Cardinality of the Power set of the set $\{0, 1, 2\}$?
- a) 8 b) 6
c) 7 d) 9
- 13) The difference of $\{1, 2, 3\}$ and $\{1, 2, 5\}$ is the set ____.
- a) $\{1\}$ b) $\{5\}$
c) $\{3\}$ d) $\{2\}$
- 14) If a normal form contains all minterms, then it is ____.
- a) a tautology b) a contradiction
c) a contingency d) both a and b

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Discrete Mathematical Structures (BTN03302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Solve any three: **12**

- What are connectives? Define all connectives with their truth table.
- What is POSET? Give the procedure to draw Hasse diagram. Give example.
- Write a note on covering and partition of a set.
- Give the relation R on the set of positive integers as $R = \{ \langle x, y \rangle \mid (x - y) \text{ is divisible by } m \}$. Show that R is equivalent relation.
- Write a note on Tautological implication with example.

Q.3 Attempt any one: **08**

- How to convert the infix notation into prefix form? Convert the following into infix and prefix form:
 $((P \wedge (Q \wedge R)) \wedge ((P \wedge Q) \wedge (P \wedge R)))$
- Obtain PCNF and PDNF of the following statement formula without constructing truth table:
 - $P \wedge (\neg p \wedge (Q \wedge (\neg Q \wedge R)))$ and
 - $(Q \wedge P) \wedge (P \wedge Q)$

Q.4 Let $X = \{1, 2, 3, 4\}$ and $R = \{ \langle x, y \rangle \mid x > y \}$. Draw the graph of R and also give its matrix. **08**

Section – II

Q.5 Solve any three: **12**

- What is monoid? Define the following with respect to monoids.
 - Homomorphism
 - Isomorphism
 - Monomorphism
- Write a note on inverse function.
- Prove the Kernel of group homomorphism g from a group $\langle G, * \rangle$ to $\langle H, \Delta \rangle$ is a subgroup of $\langle G, * \rangle$.
- Define Semi group with example and explain semi group homomorphism.
- Define Lattice as POSET and explain properties with example.

Q.6 Solve any one.

- a) Obtain sum of products canonical form of the following Boolean expressions in three variables:
- i) $X_1 * X_2$
 - ii) $X_1 \oplus (X_2 * X_3')$
- b) Define functions. Consider $X=\{a, b, c\}$ $Y=\{0,1\}$ are sets for the mapping set X to set Y. List all the possible function. Indicate in each whether the function is one-to-one, is onto, or is one-to-one onto.

Q.7 Define Algebraic system. Explain the properties of algebraic system with example.

08

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Discrete Mathematical Structures (BTN03302)

Day & Date: Tuesday, 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) The inverse of function $f(x) = x^3 + 2$ is _____.
 a) $f^{-1}(y) = (y - 2)^{1/2}$ b) $f^{-1}(y) = (y - 2)^{1/3}$
 c) $f^{-1}(y) = (y)^{1/3}$ d) $f^{-1}(y) = (y - 2)$
- 2) What is the Cartesian product of $A = \{1, 2\}$ and $B = \{a, b\}$?
 a) $\{(1, a), (1, b), (2, a), (2, b)\}$ b) $\{(1,1), (2, 2), (a, a), (b, b)\}$
 c) $\{(1, a), (2, a), (1, b), (2, b)\}$ d) $\{(1,1), (a, a), (2, a), (1, b)\}$
- 3) The set O of odd positive integers less than 10 can be expressed by _____.
 a) $\{1,2,3\}$ b) $\{13,5,7,9\}$
 c) $\{1,2,5,9\}$ d) $\{1,5,7,9,11\}$
- 4) What is the Cartesian product of $A = \{1, 2\}$ and $B = \{a, b\}$?
 a) $\{(1, a), (1, b), (2, a), (2, b)\}$ b) $\{(1, 1), (2, 2), (a, a), (b, b)\}$
 c) $\{(1, a), (2, a), (1, b), (2, b)\}$ d) $\{(1,1), (a, a), (2, a), (1, b)\}$
- 5) What is the Cardinality of the Power set of the set $\{0, 1, 2\}$?
 a) 8 b) 6
 c) 7 d) 9
- 6) The difference of $\{1, 2, 3\}$ and $\{1, 2, 5\}$ is the set _____.
 a) $\{1\}$ b) $\{5\}$
 c) $\{3\}$ d) $\{2\}$
- 7) If a normal form contains all minterms, then it is _____.
 a) a tautology b) a contradiction
 c) a contingency d) both a and b
- 8) A Poset in which every pair of elements has both a least upper bound and a greatest lower bound is termed as _____.
 a) sublattice b) lattice
 c) trail d) walk
- 9) A _____ has a greatest element and a least element which satisfy $0 \leq a \leq 1$ for every a in the lattice (say, L).
 a) semilattice b) join semilattice
 c) meet semilattice d) bounded lattice

- 10) An algebraic structure _____ is called a semigroup.
a) $(P, *)$
b) $(Q, +, *)$
c) $(P, +)$
d) $(+, *)$
- 11) Condition for monoid is _____.
a) $(a + e) = a$
b) $(a * e) = (a + e)$
c) $a = (a * (a + e))$
d) $(a * e) = (e * a) = a$
- 12) How many properties can be held by a group?
a) 2
b) 3
c) 5
d) 4
- 13) A bijection is a function which is many-one and onto.
a) True
b) False
- 14) A mapping $f: X \rightarrow Y$ is one if _____.
a) $f(x_1) \neq f(x_2)$ for all x_1, x_2 in X
b) If $f(x_1) = f(x_2)$ then $x_1 = x_2$ for all x_1, x_2 in X
c) $f(x_1) = f(x_2)$ for all x_1, x_2 in X
d) None of the mentioned

Seat No.	
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Discrete Mathematical Structures (BTN03302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Solve any three: **12**

- What are connectives? Define all connectives with their truth table.
- What is POSET? Give the procedure to draw Hasse diagram. Give example.
- Write a note on covering and partition of a set.
- Give the relation R on the set of positive integers as $R = \{ \langle x, y \rangle \mid (x - y) \text{ is divisible by } m \}$. Show that R is equivalent relation.
- Write a note on Tautological implication with example.

Q.3 Attempt any one: **08**

- How to convert the infix notation into prefix form? Convert the following into infix and prefix form:
 $((P \wedge (Q \wedge R)) \wedge ((P \wedge Q) \wedge (P \wedge R)))$
- Obtain PCNF and PDNF of the following statement formula without constructing truth table:
 - $P \wedge (\neg p \wedge (Q \wedge (\neg Q \wedge R)))$ and
 - $(Q \wedge P) \wedge (P \wedge Q)$

Q.4 Let $X = \{1, 2, 3, 4\}$ and $R = \{ \langle x, y \rangle \mid x > y \}$. Draw the graph of R and also give its matrix. **08**

Section – II

Q.5 Solve any three: **12**

- What is monoid? Define the following with respect to monoids.
 - Homomorphism
 - Isomorphism
 - Monomorphism
- Write a note on inverse function.
- Prove the Kernel of group homomorphism g from a group $\langle G, * \rangle$ to $\langle H, \Delta \rangle$ is a subgroup of $\langle G, * \rangle$.
- Define Semi group with example and explain semi group homomorphism.
- Define Lattice as POSET and explain properties with example.

Q.6 Solve any one.

- a) Obtain sum of products canonical form of the following Boolean expressions in three variables:
- i) $X_1 * X_2$
 - ii) $X_1 \oplus (X_2 * X_3')$
- b) Define functions. Consider $X=\{a, b, c\}$ $Y=\{0,1\}$ are sets for the mapping set X to set Y. List all the possible function. Indicate in each whether the function is one-to-one, is onto, or is one-to-one onto.

Q.7 Define Algebraic system. Explain the properties of algebraic system with example.

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Discrete Mathematical Structures (BTN03302)

Day & Date: Tuesday, 14-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) What is the Cartesian product of $A = \{1, 2\}$ and $B = \{a, b\}$?
 a) $\{(1, a), (1, b), (2, a), (b, b)\}$ b) $\{(1, 1), (2, 2), (a, a), (b, b)\}$
 c) $\{(1, a), (2, a), (1, b), (2, b)\}$ d) $\{(1,1), (a, a), (2, a), (1, b)\}$
- 2) What is the Cardinality of the Power set of the set $\{0, 1, 2\}$?
 a) 8 b) 6
 c) 7 d) 9
- 3) The difference of $\{1, 2, 3\}$ and $\{1, 2, 5\}$ is the set _____.
 a) $\{1\}$ b) $\{5\}$
 c) $\{3\}$ d) $\{2\}$
- 4) If a normal form contains all minterms, then it is _____.
 a) a tautology b) a contradiction
 c) a contingency d) both a and b
- 5) A Poset in which every pair of elements has both a least upper bound and a greatest lower bound is termed as _____.
 a) sublattice b) lattice
 c) trail d) walk
- 6) A _____ has a greatest element and a least element which satisfy $0 \leq a \leq 1$ for every a in the lattice (say, L).
 a) semilattice b) join semilattice
 c) meet semilattice d) bounded lattice
- 7) An algebraic structure _____ is called a semigroup.
 a) $(P, *)$ b) $(Q, +, *)$
 c) $(P, +)$ d) $(+, *)$
- 8) Condition for monoid is _____.
 a) $(a + e) = a$ b) $(a * e) = (a + e)$
 c) $a = (a * (a + e))$ d) $(a * e) = (e * a) = a$
- 9) How many properties can be held by a group?
 a) 2 b) 3
 c) 5 d) 4

Seat No.	
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Set

R

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Discrete Mathematical Structures (BTN03302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Solve any three: **12**

- What are connectives? Define all connectives with their truth table.
- What is POSET? Give the procedure to draw Hasse diagram. Give example.
- Write a note on covering and partition of a set.
- Give the relation R on the set of positive integers as $R = \{ \langle x, y \rangle \mid (x - y) \text{ is divisible by } m \}$. Show that R is equivalent relation.
- Write a note on Tautological implication with example.

Q.3 Attempt any one: **08**

- How to convert the infix notation into prefix form? Convert the following into infix and prefix form:
 $((P \wedge (Q \wedge R)) \wedge ((P \wedge Q) \wedge (P \wedge R)))$
- Obtain PCNF and PDNF of the following statement formula without constructing truth table:
 - $P \wedge (\neg p \wedge (Q \wedge (\neg Q \wedge R)))$ and
 - $(Q \wedge P) \wedge (P \wedge Q)$

Q.4 Let $X = \{1, 2, 3, 4\}$ and $R = \{ \langle x, y \rangle \mid x > y \}$. Draw the graph of R and also give its matrix. **08**

Section – II

Q.5 Solve any three: **12**

- What is monoid? Define the following with respect to monoids.
 - Homomorphism
 - Isomorphism
 - Monomorphism
- Write a note on inverse function.
- Prove the Kernel of group homomorphism g from a group $\langle G, * \rangle$ to $\langle H, \Delta \rangle$ is a subgroup of $\langle G, * \rangle$.
- Define Semi group with example and explain semi group homomorphism.
- Define Lattice as POSET and explain properties with example.

Q.6 Solve any one.

- a) Obtain sum of products canonical form of the following Boolean expressions in three variables:
- i) $X_1 * X_2$
 - ii) $X_1 \oplus (X_2 * X_3')$
- b) Define functions. Consider $X=\{a, b, c\}$ $Y=\{0,1\}$ are sets for the mapping set X to set Y. List all the possible function. Indicate in each whether the function is one-to-one, is onto, or is one-to-one onto.

Q.7 Define Algebraic system. Explain the properties of algebraic system with example.

Seat No.	
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Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume data wherever necessary.

Marks:14

14

- Page 13 of 16

- 10) A Poset in which every pair of elements has both a least upper bound and a greatest lower bound is termed as _____.
a) sublattice
b) lattice
c) trail
d) walk
- 11) A _____ has a greatest element and a least element which satisfy $0 \leq a \leq 1$ for every a in the lattice (say, L).
a) semilattice
b) join semilattice
c) meet semilattice
d) bounded lattice
- 12) An algebraic structure _____ is called a semigroup.
a) $(P, *)$
b) $(Q, +, *)$
c) $(P, +)$
d) $(+, *)$
- 13) Condition for monoid is _____.
a) $(a + e) = a$
b) $(a * e) = (a + e)$
c) $a = (a * (a + e))$
d) $(a * e) = (e * a) = a$
- 14) How many properties can be held by a group?
a) 2
b) 3
c) 5
d) 4

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Discrete Mathematical Structures (BTN03302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.

Section – I

Q.2 Solve any three: **12**

- What are connectives? Define all connectives with their truth table.
- What is POSET? Give the procedure to draw Hasse diagram. Give example.
- Write a note on covering and partition of a set.
- Give the relation R on the set of positive integers as $R = \{ \langle x, y \rangle \mid (x - y) \text{ is divisible by } m \}$. Show that R is equivalent relation.
- Write a note on Tautological implication with example.

Q.3 Attempt any one: **08**

- How to convert the infix notation into prefix form? Convert the following into infix and prefix form:
 $((P \wedge (Q \wedge R)) \wedge ((P \wedge Q) \wedge (P \wedge R)))$
- Obtain PCNF and PDNF of the following statement formula without constructing truth table:
 - $P \wedge (\neg p \wedge (Q \wedge (\neg Q \wedge R)))$ and
 - $(Q \wedge P) \wedge (P \wedge Q)$

Q.4 Let $X = \{1, 2, 3, 4\}$ and $R = \{ \langle x, y \rangle \mid x > y \}$. Draw the graph of R and also give its matrix. **08**

Section – II

Q.5 Solve any three: **12**

- What is monoid? Define the following with respect to monoids.
 - Homomorphism
 - Isomorphism
 - Monomorphism
- Write a note on inverse function.
- Prove the Kernel of group homomorphism g from a group $\langle G, * \rangle$ to $\langle H, \Delta \rangle$ is a subgroup of $\langle G, * \rangle$.
- Define Semi group with example and explain semi group homomorphism.
- Define Lattice as POSET and explain properties with example.

Q.6 Solve any one.

- a) Obtain sum of products canonical form of the following Boolean expressions in three variables:
- i) $X_1 * X_2$
 - ii) $X_1 \oplus (X_2 * X_3')$
- b) Define functions. Consider $X=\{a, b, c\}$ $Y=\{0,1\}$ are sets for the mapping set X to set Y. List all the possible function. Indicate in each whether the function is one-to-one, is onto, or is one-to-one onto.

Q.7 Define Algebraic system. Explain the properties of algebraic system with example.

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Data Structures (BTN03303)

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct option for the following.

14

- 1) In _____ technique, the searching process starts at the beginning of the list and checks every element in the list.

a) Linear search	b) Binary search
c) Hash Search	d) Binary Tree search
- 2) How many sub arrays does the quick sort algorithm divide the entire array into?

a) One	b) Two
c) Three	d) Four
- 3) If several elements are competing _____ for the same bucket in the hash table, then what is it called?

a) Diffusion	b) Replication
c) Collision	d) None of these
- 4) Which of the following principle is used if two elements in the priority queue have the same priority?

a) LIFO	b) FIFO
c) Linear tree	d) None of the above
- 5) Process of deleting an element from stack is called _____.

a) Create	b) Push
c) Enqueue	d) Pop
- 6) A variant of the linked list in which none of the nodes contain NULL pointer is _____.

a) Singly linked list	b) Doubly linked list
c) Circular linked list	d) None of these
- 7) Which of the following operation(s) is/are possible on a doubly circular linked list?

a) Insertion at beginning	b) Insertion at end
c) Deletion of specific node	d) All of these

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Data Structures (BTN03303)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. **12**

- a) Write a short note on Bubble Sort technique.
- b) What is hashing? Describe the criteria for choosing a good hash function.
- c) Write a short note on evaluation of postfix expression using suitable data structure.
- d) Explain in short the different types of linked lists.
- e) Write a short note on Priority Queue.

Q.3 Attempt any Two. **16**

- a) Write a detailed description on conversion of infix expression to postfix expression using appropriate data structure.
- b) Using a suitable example, explain in detail the radix sort technique.
- c) Write a C program to implement a Queue using Linked List.

Section – II

Q.4 Attempt any Three. **12**

- a) Write a short note on Threaded Binary Trees.
- b) Explain the Breadth First Search (BFS) traversal technique of Graph.
- c) Write a short note on B+ Trees.
- d) Explain the Adjacency Matrix representation of Graph.
- e) Write a short note on Height Balanced Trees.

Q.5 Attempt any Two. **16**

- a) Write a short note on the deletion operation in a Binary Search Tree.
- b) Explain in detail the Dijkstra's algorithm for finding shortest path in Graph.
- c) Create a B-Tree of order 5 by inserting the following keys:
3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19

Seat No.	
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Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks: 14

14

- Page 4 of 12

- 9) How many sub arrays does the quick sort algorithm divide the entire array into?

a) One	b) Two
c) Three	d) Four
- 10) If several elements are competing _____ for the same bucket in the hash table, then what is it called?

a) Diffusion	b) Replication
c) Collision	d) None of these
- 11) Which of the following principle is used if two elements in the priority queue have the same priority?

a) LIFO	b) FIFO
c) Linear tree	d) None of the above
- 12) Process of deleting an element from stack is called _____.

a) Create	b) Push
c) Enqueue	d) Pop
- 13) A variant of the linked list in which none of the nodes contain NULL pointer is _____.

a) Singly linked list	b) Doubly linked list
c) Circular linked list	d) None of these
- 14) Which of the following operation(s) is/are possible on a doubly circular linked list?

a) Insertion at beginning	b) Insertion at end
c) Deletion of specific node	d) All of these

Seat No.	
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Set	Q
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Data Structures (BTN03303)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. **12**

- a) Write a short note on Bubble Sort technique.
- b) What is hashing? Describe the criteria for choosing a good hash function.
- c) Write a short note on evaluation of postfix expression using suitable data structure.
- d) Explain in short the different types of linked lists.
- e) Write a short note on Priority Queue.

Q.3 Attempt any Two. **16**

- a) Write a detailed description on conversion of infix expression to postfix expression using appropriate data structure.
- b) Using a suitable example, explain in detail the radix sort technique.
- c) Write a C program to implement a Queue using Linked List.

Section – II

Q.4 Attempt any Three. **12**

- a) Write a short note on Threaded Binary Trees.
- b) Explain the Breadth First Search (BFS) traversal technique of Graph.
- c) Write a short note on B+ Trees.
- d) Explain the Adjacency Matrix representation of Graph.
- e) Write a short note on Height Balanced Trees.

Q.5 Attempt any Two. **16**

- a) Write a short note on the deletion operation in a Binary Search Tree.
- b) Explain in detail the Dijkstra's algorithm for finding shortest path in Graph.
- c) Create a B-Tree of order 5 by inserting the following keys:
3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Data Structures (BTN03303)

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct option for the following.

14

- 1) Which amongst the following cannot be a balance factor of any node of an AVL tree?

a) 1	b) 0
c) 2	d) -1
- 2) Which of the following is/are type(s) of rotation in an AVL tree?

a) Single rotation	b) Double rotation
c) Both of these	d) None of these
- 3) Given an undirected graph G with v vertices and e edges, the sum of the degrees of all vertices is _____.

a) E	b) 2e
c) v	d) 2v
- 4) If v is an isolated vertex in a graph, then the degree of v is _____.

a) 0	b) 1
c) 2	d) 3
- 5) In _____ technique, the searching process starts at the beginning of the list and checks every element in the list.

a) Linear search	b) Binary search
c) Hash Search	d) Binary Tree search
- 6) How many sub arrays does the quick sort algorithm divide the entire array into?

a) One	b) Two
c) Three	d) Four
- 7) If several elements are competing _____ for the same bucket in the hash table, then what is it called?

a) Diffusion	b) Replication
c) Collision	d) None of these
- 8) Which of the following principle is used if two elements in the priority queue have the same priority?

a) LIFO	b) FIFO
c) Linear tree	d) None of the above

Seat No.	
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Data Structures (BTN03303)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. **12**

- a) Write a short note on Bubble Sort technique.
- b) What is hashing? Describe the criteria for choosing a good hash function.
- c) Write a short note on evaluation of postfix expression using suitable data structure.
- d) Explain in short the different types of linked lists.
- e) Write a short note on Priority Queue.

Q.3 Attempt any Two. **16**

- a) Write a detailed description on conversion of infix expression to postfix expression using appropriate data structure.
- b) Using a suitable example, explain in detail the radix sort technique.
- c) Write a C program to implement a Queue using Linked List.

Section – II

Q.4 Attempt any Three. **12**

- a) Write a short note on Threaded Binary Trees.
- b) Explain the Breadth First Search (BFS) traversal technique of Graph.
- c) Write a short note on B+ Trees.
- d) Explain the Adjacency Matrix representation of Graph.
- e) Write a short note on Height Balanced Trees.

Q.5 Attempt any Two. **16**

- a) Write a short note on the deletion operation in a Binary Search Tree.
- b) Explain in detail the Dijkstra's algorithm for finding shortest path in Graph.
- c) Create a B-Tree of order 5 by inserting the following keys:
3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19

Seat No.	
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Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose correct option for the following.

14

- 1) A variant of the linked list in which none of the nodes contain NULL pointer is _____.
a) Singly linked list b) Doubly linked list
c) Circular linked list d) None of these
- 2) Which of the following operation(s) is/are possible on a doubly circular linked list?
a) Insertion at beginning b) Insertion at end
c) Deletion of specific node d) All of these
- 3) Which of the following is a non-linear data structure?
a) Stack b) Tree
c) Queue d) All of these
- 4) Every node in a binary search tree can have maximum _____ children.
a) 0 b) 1
c) 2 d) 3
- 5) All the leaf nodes in a B+ tree are at _____.
a) Same level b) Different level
c) Alternate levels d) Root level
- 6) Which amongst the following cannot be a balance factor of any node of an AVL tree?
a) 1 b) 0
c) 2 d) -1
- 7) Which of the following is/are type(s) of rotation in an AVL tree?
a) Single rotation b) Double rotation
c) Both of these d) None of these
- 8) Given an undirected graph G with v vertices and e edges, the sum of the degrees of all vertices is _____.
a) E b) 2e
c) v d) 2v

Seat No.	
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Set S

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Data Structures (BTN03303)

Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. 12

- a) Write a short note on Bubble Sort technique.
- b) What is hashing? Describe the criteria for choosing a good hash function.
- c) Write a short note on evaluation of postfix expression using suitable data structure.
- d) Explain in short the different types of linked lists.
- e) Write a short note on Priority Queue.

Q.3 Attempt any Two. 16

- a) Write a detailed description on conversion of infix expression to postfix expression using appropriate data structure.
- b) Using a suitable example, explain in detail the radix sort technique.
- c) Write a C program to implement a Queue using Linked List.

Section – II

Q.4 Attempt any Three. 12

- a) Write a short note on Threaded Binary Trees.
- b) Explain the Breadth First Search (BFS) traversal technique of Graph.
- c) Write a short note on B+ Trees.
- d) Explain the Adjacency Matrix representation of Graph.
- e) Write a short note on Height Balanced Trees.

Q.5 Attempt any Two. 16

- a) Write a short note on the deletion operation in a Binary Search Tree.
- b) Explain in detail the Dijkstra's algorithm for finding shortest path in Graph.
- c) Create a B-Tree of order 5 by inserting the following keys:
3, 14, 7, 1, 8, 5, 11, 17, 13, 6, 23, 12, 20, 26, 4, 16, 18, 24, 25, 19

Seat No.	
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Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no. 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks:14

14

- Page 1 of 12

- 8) Cohen-Sutherland subdivision line clipping algorithm uses _____ regions with different codes.
- | | |
|------|------|
| a) 8 | b) 6 |
| c) 4 | d) 9 |
- 9) The process of selecting and viewing the picture with different views is called _____.
- | | |
|---------------|-----------------|
| a) Clipping | b) Windowing |
| c) Segmenting | d) All of above |
- 10) A closed polyline is called a _____.
- | | |
|---------------|-----------------|
| a) Polychain | b) Polygon |
| c) Polyclosed | d) Closed chain |
- 11) In clipping if region code for both endpoints is zero then the line is _____.
- | | |
|-------------------------|-----------------------|
| a) Completely Invisible | b) Completely visible |
| c) Partially visible | d) Discarded |
- 12) The process of reducing aliasing is called _____.
- | | |
|---------------|------------------|
| a) Resolution | b) Anti aliasing |
| c) Sampling | d) Halftoning |
- 13) _____ stores the intensity values for each position.
- | | |
|-----------------|--------------------|
| a) Frame buffer | b) Depth buffer |
| c) Both a and b | d) Neither a nor b |
- 14) If a line joining any two of its interior points lies not completely inside are called _____.
- | | |
|-------------------|--------------------|
| a) Convex polygon | b) Concave polygon |
| c) Both a & b | d) None of these |

Seat No.	
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Set P

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Graphics (BTN03304)

Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. **12**

- a) Define computer graphics. Explain applications of computer graphics.
- b) Write a short note on 2D rotation.
- c) Explain 3D reflection with diagram.
- d) Compare DDA and Bresenham's Line Algorithm.

Q.3 Attempt any Two. **16**

- a) Illustrate circle generation algorithm. Consider the origin-centered circle of radius 7. Only the first quadrant is to be generated.
- b) Consider the line from (0, 0) to (5,5). Rasterize the line using DDA line drawing algorithm.
- c) Illustrate the working of Refresh Cathode Ray Tubes with neat diagram.

Section – II

Q.4 Attempt any Three. **12**

- a) Explain Bezier Curve and its properties.
- b) Elaborate Painters Algorithm.
- c) What is Z-buffer algorithm?
- d) What do you mean by Display file compilation?

Q.5 Attempt any Two. **16**

- a) Explain Midpoint subdivision algorithm with example.
- b) Elaborate the Warnock algorithm. How quadtree data structure used in Warnock algorithm?
- c) Describe Fractal lines, also describe types of fractals.

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Graphics (BTN03304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no. 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct Answer:

14

- 1) Cohen-Sutherland subdivision line clipping algorithm uses _____ regions with different codes.

a) 8	b) 6
c) 4	d) 9
- 2) The process of selecting and viewing the picture with different views is called _____.

a) Clipping	b) Windowing
c) Segmenting	d) All of above
- 3) A closed polyline is called a _____.

a) Polychain	b) Polygon
c) Polyclosed	d) Closed chain
- 4) In clipping if region code for both endpoints is zero then the line is _____.

a) Completely Invisible	b) Completely visible
c) Partially visible	d) Discarded
- 5) The process of reducing aliasing is called _____.

a) Resolution	b) Anti aliasing
c) Sampling	d) Halftoning
- 6) _____ stores the intensity values for each position.

a) Frame buffer	b) Depth buffer
c) Both a and b	d) Neither a nor b
- 7) If a line joining any two of its interior points lies not completely inside are called _____.

a) Convex polygon	b) Concave polygon
c) Both a & b	d) None of these
- 8) In computer graphics, pictures or graphics objects are presented as a collection of discrete picture element called _____.

a) Dots	b) Pixels
c) co-ordinates	d) points

- 9) The process of determining the appropriate pixel for representing, picture or graphics objects is known as _____.
a) Scan conversion b) Scanning
c) Graphical representation d) Rasterization
- 10) The computer graphics allows _____ on pictures before displaying it.
a) Rotation b) Translation
c) Scaling and projections d) All of above
- 11) Vector scan technique is also called _____.
a) Scalar scan b) Random scan
c) Raster scan d) Beam scan
- 12) In DDA line drawing algorithm, dx or dy, whichever is _____, is chosen as one raster unit.
a) 1 b) 0
c) Larger d) Smaller
- 13) _____ is the ratio of horizontal points to vertical points necessary to produce equal length lines in both directions.
a) Aspect Ratio b) Dot Pitch
c) Resolution d) Height-Width Ratio
- 14) The end point of polygon are called as _____.
a) Edges b) Line
c) Vertices d) None of these

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Graphics (BTN03304)

Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. **12**

- a) Define computer graphics. Explain applications of computer graphics.
- b) Write a short note on 2D rotation.
- c) Explain 3D reflection with diagram.
- d) Compare DDA and Bresenham's Line Algorithm.

Q.3 Attempt any Two. **16**

- a) Illustrate circle generation algorithm. Consider the origin-centered circle of radius 7. Only the first quadrant is to be generated.
- b) Consider the line from (0, 0) to (5,5). Rasterize the line using DDA line drawing algorithm.
- c) Illustrate the working of Refresh Cathode Ray Tubes with neat diagram.

Section – II

Q.4 Attempt any Three. **12**

- a) Explain Bezier Curve and its properties.
- b) Elaborate Painters Algorithm.
- c) What is Z-buffer algorithm?
- d) What do you mean by Display file compilation?

Q.5 Attempt any Two. **16**

- a) Explain Midpoint subdivision algorithm with example.
- b) Elaborate the Warnock algorithm. How quadtree data structure used in Warnock algorithm?
- c) Describe Fractal lines, also describe types of fractals.

Seat No.	
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Set

R

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Graphics (BTN03304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no. 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct Answer:**14**

- 1) In clipping if region code for both endpoints is zero then the line is _____.
 a) Completely Invisible b) Completely visible
 c) Partially visible d) Discarded
- 2) The process of reducing aliasing is called _____.
 a) Resolution b) Anti aliasing
 c) Sampling d) Halftoning
- 3) _____ stores the intensity values for each position.
 a) Frame buffer b) Depth buffer
 c) Both a and b d) Neither a nor b
- 4) If a line joining any two of its interior points lies not completely inside are called _____.
 a) Convex polygon b) Concave polygon
 c) Both a & b d) None of these
- 5) In computer graphics, pictures or graphics objects are presented as a collection of discrete picture element called _____.
 a) Dots b) Pixels
 c) co-ordinates d) points
- 6) The process of determining the appropriate pixel for representing, picture or graphics objects is known as _____.
 a) Scan conversion b) Scanning
 c) Graphical representation d) Rasterization
- 7) The computer graphics allows _____ on pictures before displaying it.
 a) Rotation b) Translation
 c) Scaling and projections d) All of above
- 8) Vector scan technique is also called _____.
 a) Scalar scan b) Random scan
 c) Raster scan d) Beam scan

- 9) In DDA line drawing algorithm, dx or dy, whichever is _____, is chosen as one raster unit.
- a) 1
 - b) 0
 - c) Larger
 - d) Smaller
- 10) _____ is the ratio of horizontal points to vertical points necessary to produce equal length lines in both directions.
- a) Aspect Ratio
 - b) Dot Pitch
 - c) Resolution
 - d) Height-Width Ratio
- 11) The end point of polygon are called as _____.
- a) Edges
 - b) Line
 - c) Vertices
 - d) None of these
- 12) Cohen-Sutherland subdivision line clipping algorithm uses _____ regions with different codes.
- a) 8
 - b) 6
 - c) 4
 - d) 9
- 13) The process of selecting and viewing the picture with different views is called _____.
- a) Clipping
 - b) Windowing
 - c) Segmenting
 - d) All of above
- 14) A closed polyline is called a _____.
- a) Polychain
 - b) Polygon
 - c) Polyclosed
 - d) Closed chain

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Graphics (BTN03304)

Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. **12**

- a) Define computer graphics. Explain applications of computer graphics.
- b) Write a short note on 2D rotation.
- c) Explain 3D reflection with diagram.
- d) Compare DDA and Bresenham's Line Algorithm.

Q.3 Attempt any Two. **16**

- a) Illustrate circle generation algorithm. Consider the origin-centered circle of radius 7. Only the first quadrant is to be generated.
- b) Consider the line from (0, 0) to (5,5). Rasterize the line using DDA line drawing algorithm.
- c) Illustrate the working of Refresh Cathode Ray Tubes with neat diagram.

Section – II

Q.4 Attempt any Three. **12**

- a) Explain Bezier Curve and its properties.
- b) Elaborate Painters Algorithm.
- c) What is Z-buffer algorithm?
- d) What do you mean by Display file compilation?

Q.5 Attempt any Two. **16**

- a) Explain Midpoint subdivision algorithm with example.
- b) Elaborate the Warnock algorithm. How quadtree data structure used in Warnock algorithm?
- c) Describe Fractal lines, also describe types of fractals.

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Graphics (BTN03304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no. 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct Answer:

14

- 1) _____ is the ratio of horizontal points to vertical points necessary to produce equal length lines in both directions.
 - a) Aspect Ratio
 - b) Dot Pitch
 - c) Resolution
 - d) Height-Width Ratio
- 2) The end point of polygon are called as _____.
 - a) Edges
 - b) Line
 - c) Vertices
 - d) None of these
- 3) Cohen-Sutherland subdivision line clipping algorithm uses _____ regions with different codes.
 - a) 8
 - b) 6
 - c) 4
 - d) 9
- 4) The process of selecting and viewing the picture with different views is called _____.
 - a) Clipping
 - b) Windowing
 - c) Segmenting
 - d) All of above
- 5) A closed polyline is called a _____.
 - a) Polychain
 - b) Polygon
 - c) Polyclosed
 - d) Closed chain
- 6) In clipping if region code for both endpoints is zero then the line is _____.
 - a) Completely Invisible
 - b) Completely visible
 - c) Partially visible
 - d) Discarded
- 7) The process of reducing aliasing is called _____.
 - a) Resolution
 - b) Anti aliasing
 - c) Sampling
 - d) Halftoning
- 8) _____ stores the intensity values for each position.
 - a) Frame buffer
 - b) Depth buffer
 - c) Both a and b
 - d) Neither a nor b

- 9) If a line joining any two of its interior points lies not completely inside are called _____.
 - a) Convex polygon
 - b) Concave polygon
 - c) Both a & b
 - d) None of these
- 10) In computer graphics, pictures or graphics objects are presented as a collection of discrete picture element called _____.
 - a) Dots
 - b) Pixels
 - c) co-ordinates
 - d) points
- 11) The process of determining the appropriate pixel for representing, picture or graphics objects is known as _____.
 - a) Scan conversion
 - b) Scanning
 - c) Graphical representation
 - d) Rasterization
- 12) The computer graphics allows _____ on pictures before displaying it.
 - a) Rotation
 - b) Translation
 - c) Scaling and projections
 - d) All of above
- 13) Vector scan technique is also called _____.
 - a) Scalar scan
 - b) Random scan
 - c) Raster scan
 - d) Beam scan
- 14) In DDA line drawing algorithm, dx or dy, whichever is _____, is chosen as one raster unit.
 - a) 1
 - b) 0
 - c) Larger
 - d) Smaller

Seat No.	
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Graphics (BTN03304)

Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three. **12**

- a) Define computer graphics. Explain applications of computer graphics.
- b) Write a short note on 2D rotation.
- c) Explain 3D reflection with diagram.
- d) Compare DDA and Bresenham's Line Algorithm.

Q.3 Attempt any Two. **16**

- a) Illustrate circle generation algorithm. Consider the origin-centered circle of radius 7. Only the first quadrant is to be generated.
- b) Consider the line from (0, 0) to (5,5). Rasterize the line using DDA line drawing algorithm.
- c) Illustrate the working of Refresh Cathode Ray Tubes with neat diagram.

Section – II

Q.4 Attempt any Three. **12**

- a) Explain Bezier Curve and its properties.
- b) Elaborate Painters Algorithm.
- c) What is Z-buffer algorithm?
- d) What do you mean by Display file compilation?

Q.5 Attempt any Two. **16**

- a) Explain Midpoint subdivision algorithm with example.
- b) Elaborate the Warnock algorithm. How quadtree data structure used in Warnock algorithm?
- c) Describe Fractal lines, also describe types of fractals.

Seat
No.

Set

P

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
COMPUTER SCIENCE & ENGINEERING
Microprocessors (BTN03305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct Answer.

14

- 1) Which of the following is correct for microprocessor Intel 8085?
 - a) 8 bit microprocessor
 - b) 16 bit microprocessor
 - c) 4 bit microprocessor
 - d) 32 bit microprocessor
- 2) Which of the following is used for storing flag registers?
 - a) Status register
 - b) Control register
 - c) Buffer register
 - d) None of the mentioned
- 3) 8086 can access up to _____.
 - a) 512KB
 - b) 1 Mb
 - c) 2 Mb
 - d) 256 KB
- 4) The instruction, MOV AX, [BX] is an example of _____.
 - a) Direct addressing mode
 - b) Register addressing mode
 - c) Register relative addressing mode
 - d) Register indirect addressing mode
- 5) The instruction, "INC" increases the contents of the specified register or memory location by _____.
 - a) 2
 - b) 0
 - c) 1
 - d) 3
- 6) The directive that marks the end of a logical segment is _____.
 - a) ENDS
 - b) END
 - c) ENDS & END
 - d) None of these
- 7) NMI stands for _____.
 - a) Non maskable interrupt
 - b) Non multiple interrupt
 - c) Non movable interrupt
 - d) None of the mentioned
- 8) Port C of 8255 can function independently as _____.
 - a) Input port
 - b) Output port
 - c) Either input or output ports
 - d) Both input and output ports

- 9) The data bus buffer is controlled by _____.
a) control word register b) read/write control logic
c) data bus d) None of the mentioned
- 10) Mode 0 is also called as _____.
a) Simple I/O mode b) Strobed I/O mode 18
c) Bidirectional I/O mode d) None of these
- 11) The unit that executes all the numeric processor instructions in 8087 is _____.
a) Control unit b) ALU
c) Numeric extension unit d) None of the mentioned
- 12) The flags that are used for controlling machine operation are called _____.
a) Status flags b) Control flags
c) Machine controlled flags d) All of the mentioned
- 13) The CPU of 80286 contains _____.
a) 16-bit general purpose registers
b) 16-bit segment registers
c) Status and control register
d) All of the mentioned
- 14) The strobed input/output mode is another name of _____.
a) Mode 0 b) Mode 1
c) Mode 2 d) None

Seat No.	
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Set

P

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
COMPUTER SCIENCE & ENGINEERING
Microprocessors (BTN03305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Attempt any Three.** **12**
- Explain flag Registers of 8085.
 - What are different types of Addressing Modes explain with example.
 - Explain Directives in 8086.
 - Explain PUSH, POP, OUT, HLT instruction.
- Q.3** Draw and explain architecture of 8086. **08**
- Q.4** **a)** Draw and explain minimum mode of 8086. **08**
- OR**
- b)** Write an assembly language program to perform addition subtraction of two 16 bit data. **08**

Section – II

- Q.5 Attempt any Three.** **12**
- Differentiate between maskable and non-maskable interrupt.
 - Explain following:
 - ISR
 - IRR
 - IMR
 - Priority Resolver
 - Write down features of 8255.
 - What are different numeric data types.
- Q.6** Draw and explain block diagram of 8257 DMA controller. **08**
- Q.7** **a)** Explain following operating mode of 8257. **08**
- rotating operating mode
 - fixed operating mode
 - auto load operating mode
 - extended write mode
- OR**
- b)** Draw and explain block diagram of 80286. **08**

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct Answer.

14

- 1) Port C of 8255 can function independently as _____.
a) Input port b) Output port
c) Either input or output ports d) Both input and output ports
- 2) The data bus buffer is controlled by _____.
a) control word register b) read/write control logic
c) data bus d) None of the mentioned
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a) Control unit b) ALU
c) Numeric extension unit d) None of the mentioned
- 5) The flags that are used for controlling machine operation are called _____.
a) Status flags b) Control flags
c) Machine controlled flags d) All of the mentioned
- 6) The CPU of 80286 contains _____.
a) 16-bit general purpose registers
b) 16-bit segment registers
c) Status and control register
d) All of the mentioned
- 7) The strobed input/output mode is another name of _____.
a) Mode 0 b) Mode 1
c) Mode 2 d) None
- 8) Which of the following is correct for microprocessor Intel 8085?
a) 8 bit microprocessor b) 16 bit microprocessor
c) 4 bit microprocessor d) 32 bit microprocessor
- 9) Which of the following is used for storing flag registers?
a) Status register b) Control register
c) Buffer register d) None of the mentioned

Seat No.	
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Set

Q

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
COMPUTER SCIENCE & ENGINEERING
Microprocessors (BTN03305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Attempt any Three.** **12**
- Explain flag Registers of 8085.
 - What are different types of Addressing Modes explain with example.
 - Explain Directives in 8086.
 - Explain PUSH, POP, OUT, HLT instruction.
- Q.3** Draw and explain architecture of 8086. **08**
- Q.4** **a)** Draw and explain minimum mode of 8086. **08**
- OR**
- b)** Write an assembly language program to perform addition subtraction of two 16 bit data. **08**

Section – II

- Q.5 Attempt any Three.** **12**
- Differentiate between maskable and non-maskable interrupt.
 - Explain following:
 - ISR
 - IRR
 - IMR
 - Priority Resolver
 - Write down features of 8255.
 - What are different numeric data types.
- Q.6** Draw and explain block diagram of 8257 DMA controller. **08**
- Q.7** **a)** Explain following operating mode of 8257. **08**
- rotating operating mode
 - fixed operating mode
 - auto load operating mode
 - extended write mode
- OR**
- b)** Draw and explain block diagram of 80286. **08**

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct Answer.

14

- 1) The unit that executes all the numeric processor instructions in 8087 is _____.
a) Control unit b) ALU
c) Numeric extension unit d) None of the mentioned
- 2) The flags that are used for controlling machine operation are called _____.
a) Status flags b) Control flags
c) Machine controlled flags d) All of the mentioned
- 3) The CPU of 80286 contains _____.
a) 16-bit general purpose registers
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a) 8 bit microprocessor b) 16 bit microprocessor
c) 4 bit microprocessor d) 32 bit microprocessor
- 6) Which of the following is used for storing flag registers?
a) Status register b) Control register
c) Buffer register d) None of the mentioned
- 7) 8086 can access up to _____.
a) 512KB b) 1 Mb
c) 2 Mb d) 256 KB
- 8) The instruction, MOV AX, [BX] is an example of _____.
a) Direct addressing mode
b) Register addressing mode
c) Register relative addressing mode
d) Register indirect addressing mode

- 9) The instruction, "INC" increases the contents of the specified register or memory location by _____.
 - a) 2
 - b) 0
 - c) 1
 - d) 3
- 10) The directive that marks the end of a logical segment is _____.
 - a) ENDS
 - b) END
 - c) ENDS & END
 - d) None of these
- 11) NMI stands for _____.
 - a) Non maskable interrupt
 - b) Non multiple interrupt
 - c) Non movable interrupt
 - d) None of the mentioned
- 12) Port C of 8255 can function independently as _____.
 - a) Input port
 - b) Output port
 - c) Either input or output ports
 - d) Both input and output ports
- 13) The data bus buffer is controlled by _____.
 - a) control word register
 - b) read/write control logic
 - c) data bus
 - d) None of the mentioned
- 14) Mode 0 is also called as _____.
 - a) Simple I/O mode
 - b) Strobed I/O mode 18
 - c) Bidirectional I/O mode
 - d) None of these

Seat No.	
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Set

R

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
COMPUTER SCIENCE & ENGINEERING
Microprocessors (BTN03305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Attempt any Three.** **12**
- Explain flag Registers of 8085.
 - What are different types of Addressing Modes explain with example.
 - Explain Directives in 8086.
 - Explain PUSH, POP, OUT, HLT instruction.
- Q.3** Draw and explain architecture of 8086. **08**
- Q.4** **a)** Draw and explain minimum mode of 8086. **08**
- OR**
- b)** Write an assembly language program to perform addition subtraction of two 16 bit data. **08**

Section – II

- Q.5 Attempt any Three.** **12**
- Differentiate between maskable and non-maskable interrupt.
 - Explain following:
 - ISR
 - IRR
 - IMR
 - Priority Resolver
 - Write down features of 8255.
 - What are different numeric data types.
- Q.6** Draw and explain block diagram of 8257 DMA controller. **08**
- Q.7** **a)** Explain following operating mode of 8257. **08**
- rotating operating mode
 - fixed operating mode
 - auto load operating mode
 - extended write mode
- OR**
- b)** Draw and explain block diagram of 80286. **08**

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98	98
99	99
100	100

Max. Marks: 70

Marks: 14

14

- Page 10 of 12

- 10)** Which of the following is correct for microprocessor Intel 8085?
a) 8 bit microprocessor b) 16 bit microprocessor
c) 4 bit microprocessor d) 32 bit microprocessor
- 11)** Which of the following is used for storing flag registers?
a) Status register b) Control register
c) Buffer register d) None of the mentioned
- 12)** 8086 can access up to _____.
a) 512KB b) 1 Mb
c) 2 Mb d) 256 KB
- 13)** The instruction, MOV AX, [BX] is an example of _____.
a) Direct addressing mode
b) Register addressing mode
c) Register relative addressing mode
d) Register indirect addressing mode
- 14)** The instruction, "INC" increases the contents of the specified register or memory location by _____.
a) 2 b) 0
c) 1 d) 3

Seat No.	
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Set

S

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024
COMPUTER SCIENCE & ENGINEERING
Microprocessors (BTN03305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Attempt any Three.** **12**
- Explain flag Registers of 8085.
 - What are different types of Addressing Modes explain with example.
 - Explain Directives in 8086.
 - Explain PUSH, POP, OUT, HLT instruction.
- Q.3** Draw and explain architecture of 8086. **08**
- Q.4** **a)** Draw and explain minimum mode of 8086. **08**
- OR**
- b)** Write an assembly language program to perform addition subtraction of two 16 bit data. **08**

Section – II

- Q.5 Attempt any Three.** **12**
- Differentiate between maskable and non-maskable interrupt.
 - Explain following:
 - ISR
 - IRR
 - IMR
 - Priority Resolver
 - Write down features of 8255.
 - What are different numeric data types.
- Q.6** Draw and explain block diagram of 8257 DMA controller. **08**
- Q.7** **a)** Explain following operating mode of 8257. **08**
- rotating operating mode
 - fixed operating mode
 - auto load operating mode
 - extended write mode
- OR**
- b)** Draw and explain block diagram of 80286. **08**

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct option**14**

- 1) The language of all string starting with bba and ending with abb over alphabet $\{a, b\}$ is represented by the regular expression.

a) $baa(a+b)^*abb$	b) $bba(a+b)^*abb$
c) $(a+b)^*abb(a+b)^*$	d) None of the above
- 2) Let $\Sigma = \{a, b, c, d\}$. How many strings are there in Σ^4 ?

a) 256	b) 16
c) 4	d) 64
- 3) Which of the following is true while converting NFA to DFA?

I) Initial state of DFA will the initial state of NFA
II) Final state of DFA will be all sets of NFA's states that include at least one accepting state of NFA
a) Statement I) is false and statement II) is false
b) Statement I) is true and statement II) is false
c) Statement I) is false and statement II) is true
d) Statement I) is true and statement II is true
- 4) Given $L = \{ab. baa\}^*$, which of the following is not in L?

a) ababaaaab	b) baaabbaa
c) abbbaaab	d) ababbbaaab
- 5) In Moore machine, the length of output is _____.

a) Same as length of input
b) Greater than length of input by one
c) Less than length of input
d) None of above
- 6) CFG $S \rightarrow AB \mid AS, A \rightarrow a \mid aA, B \rightarrow b$ generates the language _____.

a) $(ab)^*$	b) $a(ab)^*b$
c) aa^*b^+	d) aa^*b

- 7) Which of the following grammars are in Chomsky Normal Form?
- $S \rightarrow AB \mid BC \mid CD, A \rightarrow 0, B \rightarrow 1, C \rightarrow 2, D \rightarrow 3$
 - $S \rightarrow AB, S \rightarrow BCA \mid 0 \mid 1 \mid 2 \mid 3$
 - $S \rightarrow ABa, A \rightarrow aab, B \rightarrow Ac$
 - All
- 8) Which of the following is acceptance of PDA using empty stack?
- $(q_0, w, Z_0) \vdash^* (q, \varepsilon, \varepsilon)$
 - $(q_0, w, Z_0) \vdash^* (f, \varepsilon, \alpha)$
 - $(q_0, w, Z_0) \vdash^* (q, \varepsilon, \varepsilon)$ or $(q_0, w, Z_0) \vdash^* (f, \varepsilon, \alpha)$
 - None
- 9) In NPDA _____
- There must be at most one choice of move for any state q , input symbol a , and stack symbol X
 - There must be zero or more choice of move for any state q , input symbol a , and stack symbol X .
 - There must be more than choice of move for any state q , input symbol a , and stack symbol X .
 - None
- 10) Which of the following is the Pumping Lemma conditions for $z = uvwxy$?
- $|vwx| \leq n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - $|vwx| > n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - $|vwx| \equiv n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - None
- 11) Turing machine is more powerful than:
- Finite automata
 - Push down automata
 - Finite automata and Push down automata
 - None of these
- 12) A Turing machine is expressed as a 7-tuple $(Q, \Sigma, \Gamma, \delta, q_0, B, F)$ where Γ is complete set of tape symbols and Σ is a finite set of input symbols then what is always true?
- $\Gamma \subseteq \Sigma$
 - $\Sigma \subseteq \Gamma$
 - $\Sigma = \Gamma$
 - None
- 13) What is the reason behind a Turing machine is more powerful than finite state machine FSM?
- Turing machine head movement is continued to one direction.
 - Turing machine head moment is in both directions i.e. left moment and right moment as well.
 - Turing machine has capability remember arbitrary long sequence of input string.
 - All
- 14) Which of the following pairs have different expressive power?
- DFA and NFA
 - Deterministic single tape Turing machine and Non-Deterministic single tape Turing machine
 - Deterministic PDA and Non-deterministic PDA
 - Single tap Turing machine and multi-tape Turing machine

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

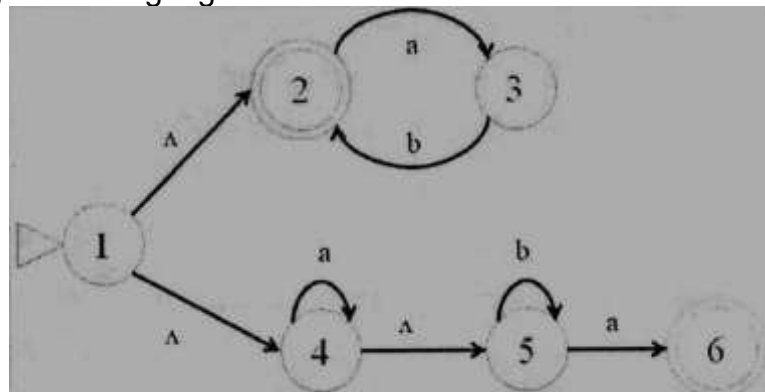
Section – I**Q.2 Attempt any Three****12**

- Compare DFA, and NFA with example.
- Give deterministic finite automata accepting following language
 - Number of 1's is even and number of 0's is odd.
 - Number of 1's is odd and number of 0's is even.
- Construct finite automata equivalent to the following regular sets
 - $10 + (0 + 11)0^* 1$
 - $(1 + 10 + 110)^* 0$
- Construct a Moore machine that takes set of all strings over $\Sigma = \{a, b\}$ as input and prints 1 as output for every occurrence of baa as substring.
- In each case what language is generated by a context free grammar.
 - $S \rightarrow aSa \mid bSb \mid \Lambda$
 - $S \rightarrow aSa \mid bSb \mid a \mid b$
 - $S \rightarrow aSb \mid bSa \mid \Lambda$
 - $S \rightarrow aS \mid bS \mid a$

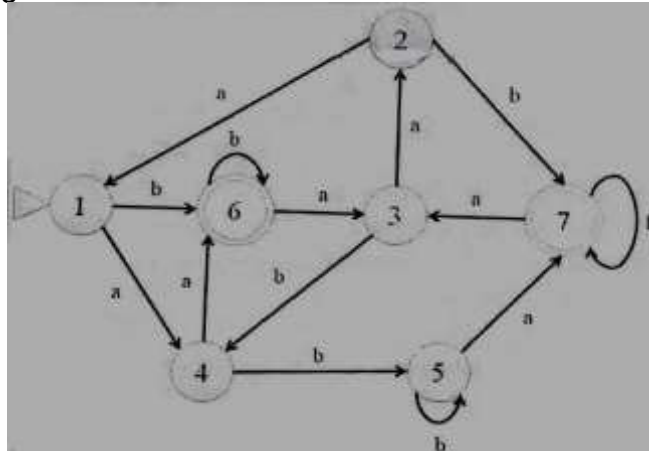
- Q.3 a)** Consider the language L1 where each string ends with 01 and the language L2 where each string ends with 10 over $\Sigma = \{0, 1\}$. Construct finite automata for $L1 \cup L2$, $L1 - L2$, $L2 - L1$ **08**

OR

- b)** For the following diagram draw deterministic finite automata accepting the same diagram of language.



- Q.4** For following finite automata, find a minimum state finite automata recognized the same language. **08**



Section – II

- Q.5 Attempt any Three.** **12**
- Define PDA with example.
 - State and explain the Pumping Lemma for CFL's.
 - Construct a Turing machine for $L = \{a^n b^n \mid n > 0\}$.
 - Design TM for $\{a, b\}^* aba$
- Q.6** a) Prove that the language $L = \{a^n b^n c^n \mid n \geq 0\}$ is not CFL using Pumping Lemma. **08**
- OR**
- b) Design PDA for even and odd palindrome.
- Q.7 Write short notes on following:** **08**
- Multi-tape Turing machine
 - Universal Turing machine
 - Non-deterministic Turing machine
 - Multi-track Turing machine

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct option

14

- 1) Which of the following is acceptance of PDA using empty stack?
 - a) $(q_0, w, Z_0) \vdash^* (q, \varepsilon, \varepsilon)$
 - b) $(q_0, w, Z_0) \vdash^* (f, \varepsilon, \alpha)$
 - c) $(q_0, w, Z_0) \vdash^* (q, \varepsilon, \varepsilon)$ or $(q_0, w, Z_0) \vdash^* (f, \varepsilon, \alpha)$
 - d) None
- 2) In NPDA _____
 - a) There must be at most one choice of move for any state q , input symbol a , and stack symbol X
 - b) There must be zero or more choice of move for any state q , input symbol a , and stack symbol X .
 - c) There must be more than choice of move for any state q , input symbol a , and stack symbol X .
 - d) None
- 3) Which of the following is the Pumping Lemma conditions for $z = uvwxy$?
 - a) $|vwx| \leq n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - b) $|vwx| > n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - c) $|vwx| \equiv n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - d) None
- 4) Turing machine is more powerful than:
 - a) Finite automata
 - b) Push down automata
 - c) Finite automata and Push down automata
 - d) None of these
- 5) A Turing machine is expressed as a 7-tuple $(Q, \Sigma, \Gamma, \delta, q_0, B, F)$ where Γ is complete set of tape symbols and Σ is a finite set of input symbols then what is always true?
 - a) $\Gamma \subseteq \Sigma$
 - b) $\Sigma \subseteq \Gamma$
 - c) $\Sigma = \Gamma$
 - d) None

- 6) What is the reason behind a Turing machine is more powerful than finite state machine FSM?
- Turing machine head movement is continued to one direction.
 - Turing machine head moment is in both directions i.e. left moment and right moment as well.
 - Turing machine has capability remember arbitrary long sequence of input string.
 - All
- 7) Which of the following pairs have different expressive power?
- DFA and NFA
 - Deterministic single tape Turing machine and Non-Deterministic single tape Turing machine
 - Deterministic PDA and Non-deterministic PDA
 - Single tap Turing machine and multi-tape Turing machine
- 8) The language of all string starting with bba and ending with abb over alphabet $\{a, b\}$ is represented by the regular expression.
- $baa(a+b)^*abb$
 - $bba(a+b)^*abb$
 - $(a+b)^*abb(a+b)^*$
 - None of the above
- 9) Let $\Sigma = \{a, b, c, d\}$. How many strings are there in Σ^4 ?
- 256
 - 16
 - 4
 - 64
- 10) Which of the following is true while converting NFA to DFA?
- Initial state of DFA will the initial state of NFA
 - Final state of DFA will be all sets of NFA's states that include at least one accepting state of NFA
- Statement I) is false and statement II) is false
 - Statement I) is true and statement II) is false
 - Statement I) is false and statement II) is true
 - Statement I) is true and statement II is true
- 11) Given $L = \{ab. baa\}^*$, which of the following is not in L ?
- ababaaab
 - baaabbaa
 - abbbaab
 - ababbbaab
- 12) In Moore machine, the length of output is _____
- Same as length of input
 - Greater than length of input by one
 - Less than length of input
 - None of above
- 13) CFG $S \rightarrow AB \mid AS, A \rightarrow a \mid aA, B \rightarrow b$ generates the language _____
- $(ab)^*$
 - $a(ab)^*b$
 - aa^*b^+
 - aa^*b
- 14) Which of the following grammars are in Chomsky Normal Form?
- $S \rightarrow AB \mid BC \mid CD, A \rightarrow 0, B \rightarrow 1, C \rightarrow 2, D \rightarrow 3$
 - $S \rightarrow AB, S \rightarrow BCA \mid 0 \mid 2 \mid 3$
 - $S \rightarrow ABa, A \rightarrow aab, B \rightarrow Ac$
 - All

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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

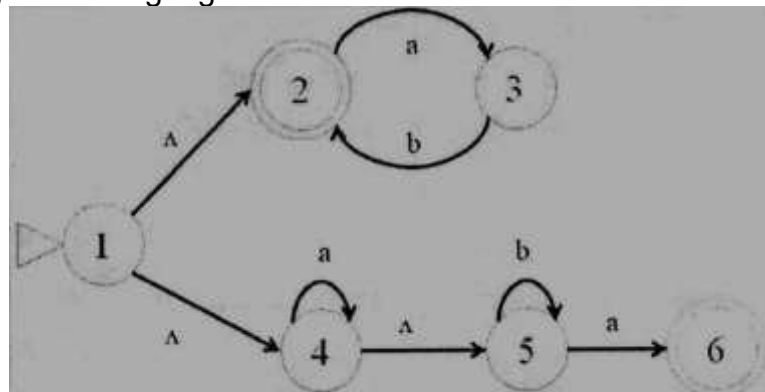
Section – I**Q.2 Attempt any Three****12**

- Compare DFA, and NFA with example.
- Give deterministic finite automata accepting following language
 - Number of 1's is even and number of 0's is odd.
 - Number of 1's is odd and number of 0's is even.
- Construct finite automata equivalent to the following regular sets
 - $10 + (0 + 11)0^* 1$
 - $(1 + 10 + 110)^* 0$
- Construct a Moore machine that takes set of all strings over $\Sigma = \{a, b\}$ as input and prints 1 as output for every occurrence of baa as substring.
- In each case what language is generated by a context free grammar.
 - $S \rightarrow aSa \mid bSb \mid \Lambda$
 - $S \rightarrow aSa \mid bSb \mid a \mid b$
 - $S \rightarrow aSb \mid bSa \mid \Lambda$
 - $S \rightarrow aS \mid bS \mid a$

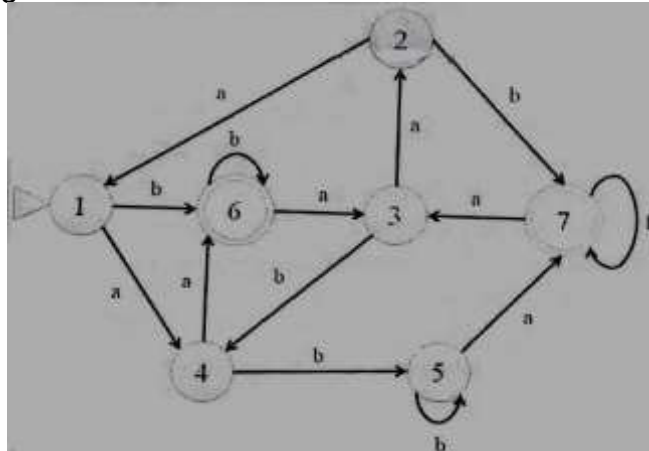
- Q.3 a)** Consider the language L_1 where each string ends with 01 and the language L_2 where each string ends with 10 over $\Sigma = \{0, 1\}$. Construct finite automata for $L_1 \cup L_2$, $L_1 - L_2$, $L_2 - L_1$ **08**

OR

- b)** For the following diagram draw deterministic finite automata accepting the same diagram of language.



- Q.4** For following finite automata, find a minimum state finite automata recognized the same language. **08**



Section – II

- Q.5 Attempt any Three.** **12**
- Define PDA with example.
 - State and explain the Pumping Lemma for CFL's.
 - Construct a Turing machine for $L = \{a^n b^n \mid n > 0\}$.
 - Design TM for $\{a, b\}^* aba$
- Q.6** a) Prove that the language $L = \{a^n b^n c^n \mid n \geq 0\}$ is not CFL using Pumping Lemma. **08**
- OR**
- b) Design PDA for even and odd palindrome.
- Q.7 Write short notes on following:** **08**
- Multi-tape Turing machine
 - Universal Turing machine
 - Non-deterministic Turing machine
 - Multi-track Turing machine

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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 3) Figures to the right indicates full marks.
 4) Assume data wherever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct option**14**

- 1) Turing machine is more powerful than:
 - a) Finite automata
 - b) Push down automata
 - c) Finite automata and Push down automata
 - d) None of these
- 2) A Turing machine is expressed as a 7-tuple $(Q, \Sigma, \Gamma, \delta, q_0, B, F)$ where Γ is complete set of tape symbols and Σ is a finite set of input symbols then what is always true?

a) $\Gamma \subseteq \Sigma$	b) $\Sigma \subseteq \Gamma$
c) $\Sigma = \Gamma$	d) None
- 3) What is the reason behind a Turing machine is more powerful than finite state machine FSM?
 - a) Turing machine head movement is continued to one direction.
 - b) Turing machine head moment is in both directions i.e. left moment and right moment as well.
 - c) Turing machine has capability remember arbitrary long sequence of input string.
 - d) All
- 4) Which of the following pairs have different expressive power?
 - a) DFA and NFA
 - b) Deterministic single tape Turing machine and Non-Deterministic single tape Turing machine
 - c) Deterministic PDA and Non-deterministic PDA
 - d) Single tap Turing machine and multi-tape Turing machine
- 5) The language of all string starting with bba and ending with abb over alphabet $\{a, b\}$ is represented by the regular expression.

a) $baa(a+b)^*abb$	b) $bba(a+b)^*abb$
c) $(a+b)^*abb(a+b)^*$	d) None of the above

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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

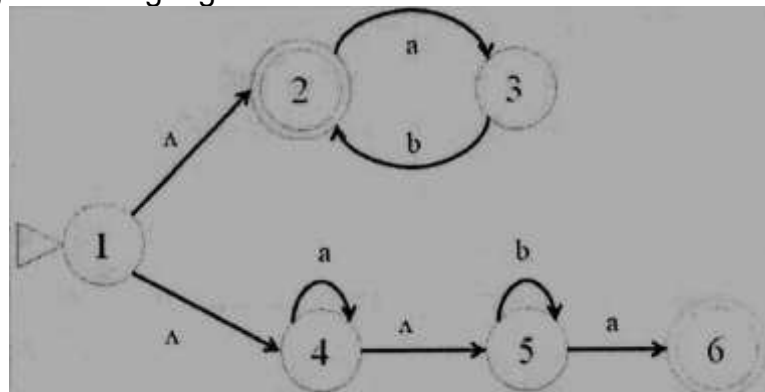
Section – I**Q.2 Attempt any Three****12**

- Compare DFA, and NFA with example.
- Give deterministic finite automata accepting following language
 - Number of 1's is even and number of 0's is odd.
 - Number of 1's is odd and number of 0's is even.
- Construct finite automata equivalent to the following regular sets
 - $10 + (0 + 11)0^* 1$
 - $(1 + 10 + 110)^* 0$
- Construct a Moore machine that takes set of all strings over $\Sigma = \{a, b\}$ as input and prints 1 as output for every occurrence of baa as substring.
- In each case what language is generated by a context free grammar.
 - $S \rightarrow aSa \mid bSb \mid \Lambda$
 - $S \rightarrow aSa \mid bSb \mid a \mid b$
 - $S \rightarrow aSb \mid bSa \mid \Lambda$
 - $S \rightarrow aS \mid bS \mid a$

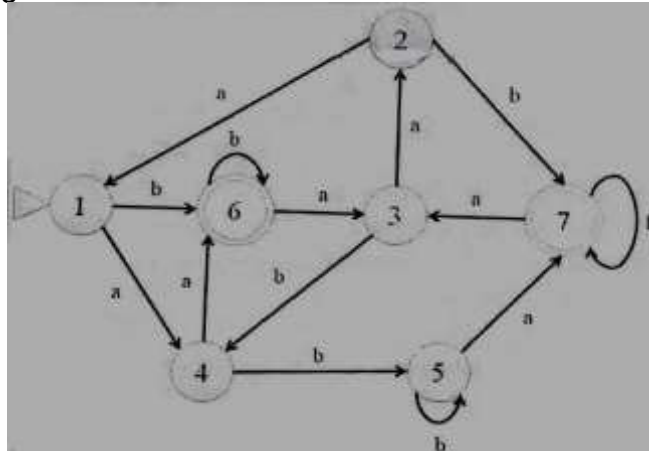
- Q.3 a)** Consider the language L1 where each string ends with 01 and the language L2 where each string ends with 10 over $\Sigma = \{0, 1\}$. Construct finite automata for $L1 \cup L2$, $L1 - L2$, $L2 - L1$ **08**

OR

- b)** For the following diagram draw deterministic finite automata accepting the same diagram of language.



- Q.4** For following finite automata, find a minimum state finite automata recognized the same language. **08**



Section – II

- Q.5 Attempt any Three.** **12**
- Define PDA with example.
 - State and explain the Pumping Lemma for CFL's.
 - Construct a Turing machine for $L = \{a^n b^n \mid n > 0\}$.
 - Design TM for $\{a, b\}^* aba$
- Q.6** **a)** Prove that the language $L = \{a^n b^n c^n \mid n \geq 0\}$ is not CFL using Pumping Lemma. **08**
- OR**
- b)** Design PDA for even and odd palindrome.
- Q.7 Write short notes on following:** **08**
- Multi-tape Turing machine
 - Universal Turing machine
 - Non-deterministic Turing machine
 - Multi-track Turing machine

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct option

14

- 1) CFG $S \rightarrow AB \mid AS, A \rightarrow a \mid aA, B \rightarrow b$ generates the language ____
 - a) $(ab)^*$
 - b) $a(ab)^*b$
 - c) aa^*b^+
 - d) aa^*b
- 2) Which of the following grammars are in Chomsky Normal Form?
 - a) $S \rightarrow AB \mid BC \mid CD, A \rightarrow 0, B \rightarrow 1, C \rightarrow 2, D \rightarrow 3$
 - b) $S \rightarrow AB, S \rightarrow BCA \mid 0 \mid 1 \mid 2 \mid 3$
 - c) $S \rightarrow ABa, A \rightarrow aab, B \rightarrow Ac$
 - d) All
- 3) Which of the following is acceptance of PDA using empty stack?
 - a) $(q_0, w, Z_0) \vdash^* (q, \varepsilon, \varepsilon)$
 - b) $(q_0, w, Z_0) \vdash^* (f, \varepsilon, \alpha)$
 - c) $(q_0, w, Z_0) \vdash^* (q, \varepsilon, \varepsilon)$ or $(q_0, w, Z_0) \vdash^* (f, \varepsilon, \alpha)$
 - d) None
- 4) In NPDA ____
 - a) There must be at most one choice of move for any state q , input symbol a , and stack symbol X
 - b) There must be zero or more choice of move for any state q , input symbol a , and stack symbol X .
 - c) There must be more than choice of move for any state q , input symbol a , and stack symbol X .
 - d) None
- 5) Which of the following is the Pumping Lemma conditions for $z = uvwxy$?
 - a) $|vwx| \leq n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - b) $|vwx| > n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - c) $|vwx| \equiv n, |vx| > 0$, and for all $i \geq 0, uv^iwx^iy$ is in L
 - d) None

- 6) Turing machine is more powerful than:
- Finite automata
 - Push down automata
 - Finite automata and Push down automata
 - None of these
- 7) A Turing machine is expressed as a 7-tuple $(Q, \Sigma, \Gamma, \delta, q_0, B, F)$ where Γ is complete set of tape symbols and Σ is a finite set of input symbols then what is always true?
- $\Gamma \subseteq \Sigma$
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 - $\Sigma = \Gamma$
 - None
- 8) What is the reason behind a Turing machine is more powerful than finite state machine FSM?
- Turing machine head movement is continued to one direction.
 - Turing machine head moment is in both directions i.e. left moment and right moment as well.
 - Turing machine has capability remember arbitrary long sequence of input string.
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- 9) Which of the following pairs have different expressive power?
- DFA and NFA
 - Deterministic single tape Turing machine and Non-Deterministic single tape Turing machine
 - Deterministic PDA and Non-deterministic PDA
 - Single tap Turing machine and multi-tape Turing machine
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 - $bba(a+b)^*abb$
 - $(a+b)^*abb(a+b)^*$
 - None of the above
- 11) Let $\Sigma = \{a, b, c, d\}$. How many strings are there in Σ^4 ?
- 256
 - 16
 - 4
 - 64
- 12) Which of the following is true while converting NFA to DFA?
- Initial state of DFA will the initial state of NFA
 - Final state of DFA will be all sets of NFA's states that include at least one accepting state of NFA
- Statement I) is false and statement II) is false
 - Statement I) is true and statement II) is false
 - Statement I) is false and statement II) is true
 - Statement I) is true and statement II) is true
- 13) Given $L = \{ab, baa\}^*$, which of the following is not in L?
- ababaaab
 - baaabbaa
 - abbbaab
 - ababbbaab
- 14) In Moore machine, the length of output is _____
- Same as length of input
 - Greater than length of input by one
 - Less than length of input
 - None of above

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Theory of Computation (BTN03402)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

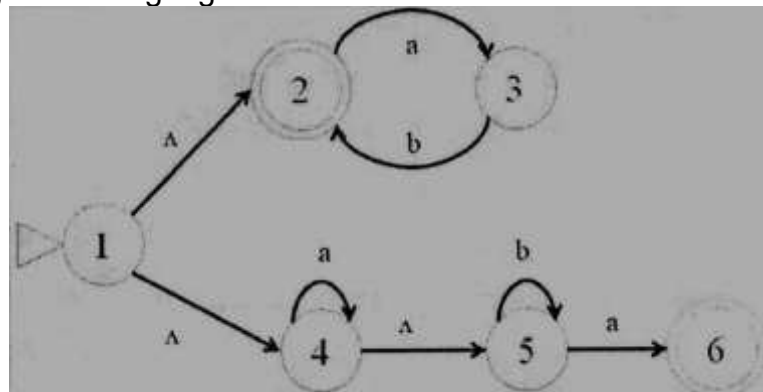
Section – I**Q.2 Attempt any Three****12**

- Compare DFA, and NFA with example.
- Give deterministic finite automata accepting following language
 - Number of 1's is even and number of 0's is odd.
 - Number of 1's is odd and number of 0's is even.
- Construct finite automata equivalent to the following regular sets
 - $10 + (0 + 11)0^* 1$
 - $(1 + 10 + 110)^* 0$
- Construct a Moore machine that takes set of all strings over $\Sigma = \{a, b\}$ as input and prints 1 as output for every occurrence of baa as substring.
- In each case what language is generated by a context free grammar.
 - $S \rightarrow aSa \mid bSb \mid \Lambda$
 - $S \rightarrow aSa \mid bSb \mid a \mid b$
 - $S \rightarrow aSb \mid bSa \mid \Lambda$
 - $S \rightarrow aS \mid bS \mid a$

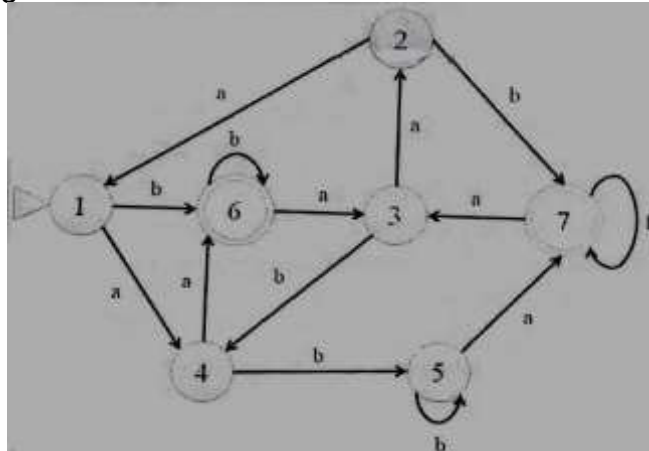
- Q.3 a)** Consider the language L1 where each string ends with 01 and the language L2 where each string ends with 10 over $\Sigma = \{0, 1\}$. Construct finite automata for $L1 \cup L2$, $L1 - L2$, $L2 - L1$ **08**

OR

- b)** For the following diagram draw deterministic finite automata accepting the same diagram of language.



- Q.4** For following finite automata, find a minimum state finite automata recognized the same language. **08**



Section – II

- Q.5 Attempt any Three.** **12**
- Define PDA with example.
 - State and explain the Pumping Lemma for CFL's.
 - Construct a Turing machine for $L = \{a^n b^n \mid n > 0\}$.
 - Design TM for $\{a, b\}^* aba$
- Q.6** **a)** Prove that the language $L = \{a^n b^n c^n \mid n \geq 0\}$ is not CFL using Pumping Lemma. **08**
- OR**
- b)** Design PDA for even and odd palindrome.
- Q.7 Write short notes on following:** **08**
- Multi-tape Turing machine
 - Universal Turing machine
 - Non-deterministic Turing machine
 - Multi-track Turing machine

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**COMPUTER SCIENCE AND ENGINEERING****Computer Organization and Architecture (BTN03403)**

Day & Date: Friday, 24-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.
4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) Which of the following is a type of computer architecture?
a) Microarchitecture b) Harvard Architecture
c) Von-Neumann Architecture d) All of the mentioned
- 2) The Sun micro systems processors usually follow _____ architecture.
a) CISC b) ISA
c) ULTRA SPARC d) RISC
- 3) Which architecture provides separate buses for program and data memory?
a) Harvard architecture b) Von Neumann architecture
c) None of the mentioned d) All of the mentioned
- 4) Which of the two architecture saves memory?
a) Harvard b) Von Neumann
c) Harvard & Von Neumann d) None of the mentioned
- 5) PC Program Counter is also called _____.
a) instruction pointer b) memory pointer
c) data counter d) file pointer
- 6) Which of the following computer memory is fastest?
a) Register b) RAM
c) Hard Disk d) None of the mentioned
- 7) Input or output devices that are connected to computer are called _____.
a) Input/Output Subsystem b) Peripheral Devices
c) Interfaces d) Interrupt
- 8) The method which offers higher speeds of I/O transfers is _____.
a) Interrupts b) Memory mapping
c) Program-controlled I/O d) DMA

- 9) The pipelining process is also called as _____.
a) Superscalar operation b) Assembly line operation
c) Von Neumann cycle d) None of the mentioned
- 10) The periods of time when the unit is idle is called as _____.
a) Stalls b) Bubbles
c) Hazards d) Both Stalls and Bubbles
- 11) The situation wherein the data of operands are not available is called _____.
a) Data hazard b) Stock
c) Deadlock d) Structural hazard
- 12) The eliminating stage of WAR and WAW hazards is often called _____.
a) Execution b) Anti-dependence
c) Data hazards d) Dispatch
- 13) A bus which is designed for allowing processors, I/O devices and memory, is called a _____.
a) Process-memory bus b) Bus transaction
c) Synchronous bus d) Backplane bus
- 14) Several instructions execution simultaneously in _____.
a) Processing b) Parallel processing
c) Serial processing d) Multitasking

Seat No.	
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Set P**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****COMPUTER SCIENCE AND ENGINEERING****Computer Organization and Architecture (BTN03403)**

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three **12**

- a) Explain instruction types with suitable example.
- b) Explain in detail functional unit of computer system.
- c) Explain in detail message passing model.
- d) Explain in detail memory hierarchy.

Q.3 Attempt any Two **16**

- a) Write a short note on
 - i) Shared Variable model
 - ii) Data parallel model
- b) $x = a \times b + c \times c$ solve this equation by zero, one, two, three address Instruction processor.
- c) Explain in detail ISA architecture.

Section – II

Q.4 Attempt any Three **12**

- a) Difference between Linear and Non-linear pipeline.
- b) Define I/O module. Explain its function in detail.
- c) With neat diagram, explain any one shared memory multiprocessor model.
- d) Explain basic compiler techniques for exposing ILP.

Q.5 Attempt any Two **16**

- a) Explain in detail Flynn's classification of parallel computer architectures.
- b) Explain in detail exploiting ILP using multiple issues & static scheduling.
- c) What are hazards? Write a note on structural hazards.

Seat No.	
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COMPUTER SCIENCE AND ENGINEERING

Computer Organization and Architecture (BTN03403)

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.

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4) Assume suitable data if necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options and rewrite the sentence.

14

- 1) The method which offers higher speeds of I/O transfers is _____.
a) Interrupts b) Memory mapping
c) Program-controlled I/O d) DMA
- 2) The pipelining process is also called as _____.
a) Superscalar operation b) Assembly line operation
c) Von Neumann cycle d) None of the mentioned
- 3) The periods of time when the unit is idle is called as _____.
a) Stalls b) Bubbles
c) Hazards d) Both Stalls and Bubbles
- 4) The situation wherein the data of operands are not available is called _____.
a) Data hazard b) Stock
c) Deadlock d) Structural hazard
- 5) The eliminating stage of WAR and WAW hazards is often called _____.
a) Execution b) Anti-dependence
c) Data hazards d) Dispatch
- 6) A bus which is designed for allowing processors, I/O devices and memory, is called a _____.
a) Process-memory bus b) Bus transaction
c) Synchronous bus d) Backplane bus
- 7) Several instructions execution simultaneously in _____.
a) Processing b) Parallel processing
c) Serial processing d) Multitasking
- 8) Which of the following is a type of computer architecture?
a) Microarchitecture b) Harvard Architecture
c) Von-Neumann Architecture d) All of the mentioned

- 9) The Sun micro systems processors usually follow _____ architecture.
 - a) CISC
 - b) ISA
 - c) ULTRA SPARC
 - d) RISC
- 10) Which architecture provides separate buses for program and data memory?
 - a) Harvard architecture
 - b) Von Neumann architecture
 - c) None of the mentioned
 - d) All of the mentioned
- 11) Which of the two architecture saves memory?
 - a) Harvard
 - b) Von Neumann
 - c) Harvard & Von Neumann
 - d) None of the mentioned
- 12) PC Program Counter is also called _____.
 - a) instruction pointer
 - b) memory pointer
 - c) data counter
 - d) file pointer
- 13) Which of the following computer memory is fastest?
 - a) Register
 - b) RAM
 - c) Hard Disk
 - d) None of the mentioned
- 14) Input or output devices that are connected to computer are called _____.
 - a) Input/Output Subsystem
 - b) Peripheral Devices
 - c) Interfaces
 - d) Interrupt

Seat No.	
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Set Q

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Organization and Architecture (BTN03403)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three **12**

- a) Explain instruction types with suitable example.
- b) Explain in detail functional unit of computer system.
- c) Explain in detail message passing model.
- d) Explain in detail memory hierarchy.

Q.3 Attempt any Two **16**

- a) Write a short note on
 - i) Shared Variable model
 - ii) Data parallel model
- b) $x = a \times b + c \times c$ solve this equation by zero, one, two, three address Instruction processor.
- c) Explain in detail ISA architecture.

Section – II

Q.4 Attempt any Three **12**

- a) Difference between Linear and Non-linear pipeline.
- b) Define I/O module. Explain its function in detail.
- c) With neat diagram, explain any one shared memory multiprocessor model.
- d) Explain basic compiler techniques for exposing ILP.

Q.5 Attempt any Two **16**

- a) Explain in detail Flynn's classification of parallel computer architectures.
- b) Explain in detail exploiting ILP using multiple issues & static scheduling.
- c) What are hazards? Write a note on structural hazards.

Seat No.	
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COMPUTER SCIENCE AND ENGINEERING

Computer Organization and Architecture (BTN03403)

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.

- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options and rewrite the sentence. **14**

- 1) The situation wherein the data of operands are not available is called _____.
a) Data hazard b) Stock
c) Deadlock d) Structural hazard
- 2) The eliminating stage of WAR and WAW hazards is often called _____.
a) Execution b) Anti-dependence
c) Data hazards d) Dispatch
- 3) A bus which is designed for allowing processors, I/O devices and memory, is called a _____.
a) Process-memory bus b) Bus transaction
c) Synchronous bus d) Backplane bus
- 4) Several instructions execution simultaneously in _____.
a) Processing b) Parallel processing
c) Serial processing d) Multitasking
- 5) Which of the following is a type of computer architecture?
a) Microarchitecture b) Harvard Architecture
c) Von-Neumann Architecture d) All of the mentioned
- 6) The Sun micro systems processors usually follow _____ architecture.
a) CISC b) ISA
c) ULTRA SPARC d) RISC
- 7) Which architecture provides separate buses for program and data memory?
a) Harvard architecture b) Von Neumann architecture
c) None of the mentioned d) All of the mentioned
- 8) Which of the two architecture saves memory?
a) Harvard b) Von Neumann
c) Harvard & Von Neumann d) None of the mentioned

- 9) PC Program Counter is also called _____.
a) instruction pointer b) memory pointer
c) data counter d) file pointer
- 10) Which of the following computer memory is fastest?
a) Register b) RAM
c) Hard Disk d) None of the mentioned
- 11) Input or output devices that are connected to computer are called _____.
a) Input/Output Subsystem b) Peripheral Devices
c) Interfaces d) Interrupt
- 12) The method which offers higher speeds of I/O transfers is _____.
a) Interrupts b) Memory mapping
c) Program-controlled I/O d) DMA
- 13) The pipelining process is also called as _____.
a) Superscalar operation b) Assembly line operation
c) Von Neumann cycle d) None of the mentioned
- 14) The periods of time when the unit is idle is called as _____.
a) Stalls b) Bubbles
c) Hazards d) Both Stalls and Bubbles

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Computer Organization and Architecture (BTN03403)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Three **12**

- a) Explain instruction types with suitable example.
- b) Explain in detail functional unit of computer system.
- c) Explain in detail message passing model.
- d) Explain in detail memory hierarchy.

Q.3 Attempt any Two **16**

- a) Write a short note on
 - i) Shared Variable model
 - ii) Data parallel model
- b) $x = a \times b + c \times c$ solve this equation by zero, one, two, three address Instruction processor.
- c) Explain in detail ISA architecture.

Section – II

Q.4 Attempt any Three **12**

- a) Difference between Linear and Non-linear pipeline.
- b) Define I/O module. Explain its function in detail.
- c) With neat diagram, explain any one shared memory multiprocessor model.
- d) Explain basic compiler techniques for exposing ILP.

Q.5 Attempt any Two **16**

- a) Explain in detail Flynn's classification of parallel computer architectures.
- b) Explain in detail exploiting ILP using multiple issues & static scheduling.
- c) What are hazards? Write a note on structural hazards.

Seat No.	
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Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

Marks:14

14

- 1) Which of the following computer memory is fastest?
 - a) Register
 - b) RAM
 - c) Hard Disk
 - d) None of the mentioned
- 2) Input or output devices that are connected to computer are called _____.
 - a) Input/Output Subsystem
 - b) Peripheral Devices
 - c) Interfaces
 - d) Interrupt
- 3) The method which offers higher speeds of I/O transfers is _____.
 - a) Interrupts
 - b) Memory mapping
 - c) Program-controlled I/O
 - d) DMA
- 4) The pipelining process is also called as _____.
 - a) Superscalar operation
 - b) Assembly line operation
 - c) Von Neumann cycle
 - d) None of the mentioned
- 5) The periods of time when the unit is idle is called as _____.
 - a) Stalls
 - b) Bubbles
 - c) Hazards
 - d) Both Stalls and Bubbles
- 6) The situation wherein the data of operands are not available is called _____.
 - a) Data hazard
 - b) Stock
 - c) Deadlock
 - d) Structural hazard
- 7) The eliminating stage of WAR and WAW hazards is often called _____.
 - a) Execution
 - b) Anti-dependence
 - c) Data hazards
 - d) Dispatch
- 8) A bus which is designed for allowing processors, I/O devices and memory, is called a _____.
 - a) Process-memory bus
 - b) Bus transaction
 - c) Synchronous bus
 - d) Backplane bus
- 9) Several instructions execution simultaneously in _____.
 - a) Processing
 - b) Parallel processing
 - c) Serial processing
 - d) Multitasking

- 10)** Which of the following is a type of computer architecture?
a) Microarchitecture b) Harvard Architecture
c) Von-Neumann Architecture d) All of the mentioned
- 11)** The Sun micro systems processors usually follow _____ architecture.
a) CISC b) ISA
c) ULTRA SPARC d) RISC
- 12)** Which architecture provides separate buses for program and data memory?
a) Harvard architecture b) Von Neumann architecture
c) None of the mentioned d) All of the mentioned
- 13)** Which of the two architecture saves memory?
a) Harvard b) Von Neumann
c) Harvard & Von Neumann d) None of the mentioned
- 14)** PC Program Counter is also called _____.
a) instruction pointer b) memory pointer
c) data counter d) file pointer

Seat No.	
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Set S**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****COMPUTER SCIENCE AND ENGINEERING****Computer Organization and Architecture (BTN03403)**

Day & Date: Friday, 24-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I**Q.2 Attempt any Three 12**

- a) Explain instruction types with suitable example.
- b) Explain in detail functional unit of computer system.
- c) Explain in detail message passing model.
- d) Explain in detail memory hierarchy.

Q.3 Attempt any Two 16

- a) Write a short note on
 - i) Shared Variable model
 - ii) Data parallel model
- b) $x = a \times b + c \times c$ solve this equation by zero, one, two, three address Instruction processor.
- c) Explain in detail ISA architecture.

Section – II**Q.4 Attempt any Three 12**

- a) Difference between Linear and Non-linear pipeline.
- b) Define I/O module. Explain its function in detail.
- c) With neat diagram, explain any one shared memory multiprocessor model.
- d) Explain basic compiler techniques for exposing ILP.

Q.5 Attempt any Two 16

- a) Explain in detail Flynn's classification of parallel computer architectures.
- b) Explain in detail exploiting ILP using multiple issues & static scheduling.
- c) What are hazards? Write a note on structural hazards.

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Computer Networks (BTN03404)

Max. Marks: 70

MCQ/Objective Type Questions

Marks: 14

14

- Page 1 of 12

- 9) Which one of the following allows client to update their DNS entry as their IP address change?
- a) dynamic DNS
 - b) mail transfer agent
 - c) authoritative name server
 - d) None of the mentioned
- 10) Which standard TCP port is assigned for contacting SSH servers?
- a) port 21
 - b) port 22
 - c) port 23
 - d) port 24
- 11) Port forwarding is also known as ____.
- a) Component forwarding
 - b) SSH-application forwarding
 - c) SSH packet forwarding
 - d) SSH tunnelling
- 12) ____ allows you to connect and login to a remote computer.
- a) TELNET
 - b) FTP
 - c) HTTP
 - d) SMTP
- 13) POP is also known as ____ protocol.
- a) Pull
 - b) Push
 - c) Both a and b
 - d) None of the above
- 14) MTA stands for ____.
- a) Message Travel Agency
 - b) Message Transfer Agent
 - c) Message Transmission Agency
 - d) Message Transfer Again

Seat No.	
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Set P**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024****COMPUTER SCIENCE & ENGINEERING****Computer Networks (BTN03404)**

Day & Date: Sunday, 26-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I**Q.2 Attempt the following (Any Three) 12**

- a) Explain Logical address with neat diagram.
- b) Describe any 4 services provided by UDP.
- c) What is Three-way handshaking in TCP?
- d) Summarize any Socket System Call.

Q.3 Attempt the following (Any Two) 16

- a) Summarize the layers of OSI reference model in detail with neat diagram.
- b) Elaborate the Connectionless Iterative server in detail.
- c) Draw and describe TCP segment format.

Section – II**Q.4 Attempt the following (Any Three) 12**

- a) Describe Resolution in DNS.
- b) Explain NVT with diagram.
- c) What is TFTP? Explain its applications.
- d) Describe Message Access Agent (MAA) in email architecture.

Q.5 Attempt the following (Any Two) 16

- a) Explain Email architecture with its four scenarios.
- b) Elaborate DNS in the Internet.
- c) Explain address allocation in DHCP. Draw DHCP client State transition diagram.

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Computer Networks (BTN03404)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct Answer

14

- 1) FTP required while _____ transmitting data.
 - a) 1 connection
 - b) 2 connections
 - c) 3 connections
 - d) 4 connections
- 2) Which one of the following allows client to update their DNS entry as their IP address change?
 - a) dynamic DNS
 - b) mail transfer agent
 - c) authoritative name server
 - d) None of the mentioned
- 3) Which standard TCP port is assigned for contacting SSH servers?
 - a) port 21
 - b) port 22
 - c) port 23
 - d) port 24
- 4) Port forwarding is also known as _____.
 - a) Component forwarding
 - b) SSH-application forwarding
 - c) SSH packet forwarding
 - d) SSH tunnelling
- 5) _____ allows you to connect and login to a remote computer.
 - a) TELNET
 - b) FTP
 - c) HTTP
 - d) SMTP
- 6) POP is also known as _____ protocol.
 - a) Pull
 - b) Push
 - c) Both a and b
 - d) None of the above
- 7) MTA stands for _____.
 - a) Message Travel Agency
 - b) Message Transfer Agent
 - c) Message Transmission Agency
 - d) Message Transfer Again
- 8) Physical addresses also known as _____.
 - a) Link address
 - b) MAC address
 - c) Hardware address
 - d) All of the mentioned
- 9) Which layer is responsible for process-to-process delivery in an OSI network model?
 - a) network layer
 - b) transport layer
 - c) session layer
 - d) data link layer

- 10)** Supernetting _____ the length of the netid and _____ the length of hostid.
a) decreases, increases b) increases, decreases
c) increases, increases d) decreases, decreases
- 11)** In TCP/IP reference model transmission data rate is decided by _____.
a) network layer b) physical layer
c) data link layer d) transport layer
- 12)** Identify the default mask for the given IP address 192.168.200.10
a) 255.255.255.0 b) 255.0.0.0
c) 255.255.0.0 d) 255.255.255.255
- 13)** A computer that uses the _____ system, stores the most significant bytes of data in the starting address of the data unit.
a) Little-Endian b) Big-Endian
c) Both a and b d) None of the mentioned
- 14)** Which of the following socket system call is use to create a child process at server side?
a) socket() b) bind()
c) fork() d) accept()

Seat No.	
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Set

Q

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

COMPUTER SCIENCE & ENGINEERING**Computer Networks (BTN03404)**

Day & Date: Sunday, 26-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I**Q.2 Attempt the following (Any Three) 12**

- Explain Logical address with neat diagram.
- Describe any 4 services provided by UDP.
- What is Three-way handshaking in TCP?
- Summarize any Socket System Call.

Q.3 Attempt the following (Any Two) 16

- Summarize the layers of OSI reference model in detail with neat diagram.
- Elaborate the Connectionless Iterative server in detail.
- Draw and describe TCP segment format.

Section – II**Q.4 Attempt the following (Any Three) 12**

- Describe Resolution in DNS.
- Explain NVT with diagram.
- What is TFTP? Explain its applications.
- Describe Message Access Agent (MAA) in email architecture.

Q.5 Attempt the following (Any Two) 16

- Explain Email architecture with its four scenarios.
- Elaborate DNS in the Internet.
- Explain address allocation in DHCP. Draw DHCP client State transition diagram.

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Computer Networks (BTN03404)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct Answer

14

- 1) Port forwarding is also known as _____.
 a) Component forwarding b) SSH-application forwarding
 c) SSH packet forwarding d) SSH tunnelling
- 2) _____ allows you to connect and login to a remote computer.
 a) TELNET b) FTP
 c) HTTP d) SMTP
- 3) POP is also known as _____ protocol.
 a) Pull b) Push
 c) Both a and b d) None of the above
- 4) MTA stands for _____.
 a) Message Travel Agency b) Message Transfer Agent
 c) Message Transmission Agency d) Message Transfer Again
- 5) Physical addresses also known as _____.
 a) Link address b) MAC address
 c) Hardware address d) All of the mentioned
- 6) Which layer is responsible for process-to-process delivery in an OSI network model?
 a) network layer b) transport layer
 c) session layer d) data link layer
- 7) Supernetting _____ the length of the netid and _____ the length of hostid.
 a) decreases, increases b) increases, decreases
 c) increases, increases d) decreases, decreases
- 8) In TCP/IP reference model transmission data rate is decided by _____.
 a) network layer b) physical layer
 c) data link layer d) transport layer
- 9) Identify the default mask for the given IP address 192.168.200.10
 a) 255.255.255.0 b) 255.0.0.0
 c) 255.255.0.0 d) 255.255.255.255

- 10)** A computer that uses the _____ system, stores the most significant bytes of data in the starting address of the data unit.
- a) Little-Endian
 - b) Big-Endian
 - c) Both a and b
 - d) None of the mentioned
- 11)** Which of the following socket system call is use to create a child process at server side?
- a) socket()
 - b) bind()
 - c) fork()
 - d) accept()
- 12)** FTP required while _____ transmitting data.
- a) 1 connection
 - b) 2 connections
 - c) 3 connections
 - d) 4 connections
- 13)** Which one of the following allows client to update their DNS entry as their IP address change?
- a) dynamic DNS
 - b) mail transfer agent
 - c) authoritative name server
 - d) None of the mentioned
- 14)** Which standard TCP port is assigned for contacting SSH servers?
- a) port 21
 - b) port 22
 - c) port 23
 - d) port 24

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Computer Networks (BTN03404)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Attempt the following (Any Three) 12**
- Explain Logical address with neat diagram.
 - Describe any 4 services provided by UDP.
 - What is Three-way handshaking in TCP?
 - Summarize any Socket System Call.
- Q.3 Attempt the following (Any Two) 16**
- Summarize the layers of OSI reference model in detail with neat diagram.
 - Elaborate the Connectionless Iterative server in detail.
 - Draw and describe TCP segment format.

Section – II

- Q.4 Attempt the following (Any Three) 12**
- Describe Resolution in DNS.
 - Explain NVT with diagram.
 - What is TFTP? Explain its applications.
 - Describe Message Access Agent (MAA) in email architecture.
- Q.5 Attempt the following (Any Two) 16**
- Explain Email architecture with its four scenarios.
 - Elaborate DNS in the Internet.
 - Explain address allocation in DHCP. Draw DHCP client State transition diagram.

Seat
No.Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Computer Networks (BTN03404)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct Answer

14

- 1) A computer that uses the _____ system, stores the most significant bytes of data in the starting address of the data unit.
 - a) Little-Endian
 - b) Big-Endian
 - c) Both a and b
 - d) None of the mentioned
- 2) Which of the following socket system call is use to create a child process at server side?
 - a) socket()
 - b) bind()
 - c) fork()
 - d) accept()
- 3) FTP required while _____ transmitting data.
 - a) 1 connection
 - b) 2 connections
 - c) 3 connections
 - d) 4 connections
- 4) Which one of the following allows client to update their DNS entry as their IP address change?
 - a) dynamic DNS
 - b) mail transfer agent
 - c) authoritative name server
 - d) None of the mentioned
- 5) Which standard TCP port is assigned for contacting SSH servers?
 - a) port 21
 - b) port 22
 - c) port 23
 - d) port 24
- 6) Port forwarding is also known as _____.
 - a) Component forwarding
 - b) SSH-application forwarding
 - c) SSH packet forwarding
 - d) SSH tunnelling
- 7) _____ allows you to connect and login to a remote computer.
 - a) TELNET
 - b) FTP
 - c) HTTP
 - d) SMTP
- 8) POP is also known as _____ protocol.
 - a) Pull
 - b) Push
 - c) Both a and b
 - d) None of the above

- 9) MTA stands for _____.
a) Message Travel Agency b) Message Transfer Agent
c) Message Transmission Agency d) Message Transfer Again
- 10) Physical addresses also known as _____.
a) Link address b) MAC address
c) Hardware address d) All of the mentioned
- 11) Which layer is responsible for process-to-process delivery in an OSI network model?
a) network layer b) transport layer
c) session layer d) data link layer
- 12) Supernetting _____ the length of the netid and _____ the length of hostid.
a) decreases, increases b) increases, decreases
c) increases, increases d) decreases, decreases
- 13) In TCP/IP reference model transmission data rate is decided by _____.
a) network layer b) physical layer
c) data link layer d) transport layer
- 14) Identify the default mask for the given IP address 192.168.200.10
a) 255.255.255.0 b) 255.0.0.0
c) 255.255.0.0 d) 255.255.255.255

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Computer Networks (BTN03404)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Attempt the following (Any Three) 12**
- Explain Logical address with neat diagram.
 - Describe any 4 services provided by UDP.
 - What is Three-way handshaking in TCP?
 - Summarize any Socket System Call.
- Q.3 Attempt the following (Any Two) 16**
- Summarize the layers of OSI reference model in detail with neat diagram.
 - Elaborate the Connectionless Iterative server in detail.
 - Draw and describe TCP segment format.

Section – II

- Q.4 Attempt the following (Any Three) 12**
- Describe Resolution in DNS.
 - Explain NVT with diagram.
 - What is TFTP? Explain its applications.
 - Describe Message Access Agent (MAA) in email architecture.
- Q.5 Attempt the following (Any Two) 16**
- Explain Email architecture with its four scenarios.
 - Elaborate DNS in the Internet.
 - Explain address allocation in DHCP. Draw DHCP client State transition diagram.

Seat No.	
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- 8) The α – cut of any fuzzy set is _____.
 a) Fuzzy set b) Ordinary set (Crisp set)
 c) Subset of fuzzy set d) None
- 9) While solving an assignment problem an activity is assigned to a resource with zero opportunity cost the objective is to _____.
 a) Reduce the cost of assignment to zero
 b) Minimize total cost of an assignment
 c) Reduce the cost of that particular assignment to minimum
 d) None
- 10) I) Every ordinary set is a fuzzy set.
 II) Every fuzzy set is an ordinary set, then
 a) Both are true b) Only I is true
 c) Only II is true d) Both are false
- 11) If A is a fuzzy set defined on $X = \{0, 10\}$ by $A(x) = \frac{1-x}{x+3}$ then equilibrium point is _____.
 a) 0 b) 1/2
 c) -1/3 d) 1/3
- 12) A variable which does not appear in the basic variable (B) column of simplex table is _____.
 a) never equal to zero b) always equal to zero
 c) called a basic variable d) none
- 13) For fuzzy sets A, B $|A| = 3$ $|B| = 10$, $|A \cap B| = 0.9$ then $S(B, A) =$ _____.
 a) 0.09 b) 0.9
 c) 0.3 d) 0.99
- 14) For the fuzzy sets _____.
- | Elements | x_1 | x_2 | x_3 | x_4 | x_5 | x_6 |
|----------|-------|-------|-------|-------|-------|-------|
| $A(x)$: | 0.1 | 0.6 | 0.8 | 0.9 | 0.7 | 0.1 |
| $B(x)$: | 0.9 | 0.7 | 0.5 | 0.2 | 0.1 | 0 |
- then set $A \cup B =$ is
- a) $\frac{1}{x_1} + \frac{1}{x_2}$
 b) $\frac{0.9}{x_1} + \frac{0.6}{x_2} + \frac{0.8}{x_3} + \frac{0.9}{x_4} + \frac{0.7}{x_5} + \frac{0.1}{x_6}$
 c) $\frac{0.9}{x_1} + \frac{0.7}{x_2} + \frac{0.8}{x_3} + \frac{0.9}{x_4} + \frac{0.7}{x_5} + \frac{0.1}{x_6}$
 d) $\frac{1}{x_1} + \frac{1}{x_2} + \frac{0.2}{x_3} + \frac{0.1}{x_4} + \frac{0.1}{x_5} + \frac{0}{x_6}$

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – II (BTN03401)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 4) Assume suitable data if necessary.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three from the following. 09

- Find an approximate positive real root of $3x - \cos x = 1$ by False position method. (Perform 2 iterations).
- Solve by Newton Raphson method $x^3 = 6x - 4$ correct to three decimal places.
- Solve the system of equations by Gauss Elimination method.
 $x + 2y + z = 3, 2x + 3y + 3z = 10, 3x - y + 2z = 13$
- Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using Trapezoidal rule.

Q.3 Attempt any three from the following. 09

- Evaluate $\sqrt{37}$ by Newton Raphson method correct to four decimal places by taking initial approximation as $x_0 = 6$
- Solve the system of equations by Jacobi's method. (Perform 3 iterations)
 $20x + y - 2z = 17, \quad 3x + 20y - z = -18, \quad 2x - 3y + 20z = 25$
- | | | | | | |
|------|---|---|---|---|---|
| x | : | 2 | 4 | 6 | 8 |
| f(x) | : | 3 | 5 | 6 | 7 |

Then using Simpson's $1/3^{\text{rd}}$ rule, find the value of $\int_2^8 f(x) dx$

- Evaluate $\int_1^{1.2} \int_1^{1.4} \frac{1}{x+y} dx dy$ $h = 0.1, k = 0.1$ by Trapezoidal rule.

Q.4 Attempt any two from the following. 10

- Evaluate $\int_0^2 \frac{1}{4+x^2} dx$ using Romberg's method with $n = 2$.
- Solve the simultaneous equations $x^2 + y - 11 = 0$ and $y^2 + x - 7 = 0$. the initial approximations $x_0 = 3.5$ and $y_0 = -1.5$ using Newton Raphson method. (Perform two iterations)
- Solve the system of equations by Gauss Siedal method
 $8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z = 35$.
 (Perform four iterations)

Section – II

Q.5 Attempt any three of the following.

09

a) For the fuzzy sets

Elements	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

find $(A \cup B)', A' \cap B'$

b) Evaluate the following

1) $[-1, 2] + [1, 3]$

2) $[-2, 4] - [3, 6]$

3) $[-3, 4] \cdot [-3, 4]$

4) $[-4, 6] / [1, 2]$

c) Define

1) Feasible Solution

2) Basic Feasible Solution

3) Optimum solution

4) Degenerate solution

d) Find I.B.F.S by using Hungarian method

	I	II	III	IV
A	15	14	12	16
B	23	22	25	24
C	31	34	32	33
D	21	32	44	53

Q.6 Attempt any three of the following.

09

a) Determine whether the following fuzzy set is a fuzzy number

$$C(x) = \begin{cases} \tan x & 0 \leq x \leq \pi/4 \\ 0 & \text{otherwise} \end{cases}$$

b) Solve the fuzzy equation $A + X = B$

where $\alpha_A = [\alpha + 4, 6 - \alpha]$ and $\alpha_B = [10 + 10\alpha, 35 - 15\alpha]$

c) For the fuzzy sets

Elements:	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

then find fuzzy set $0.7_A \cap_B$ d) Maximize $Z = 3x_1 + 2x_2$ subject to

$x_1 + x_2 \leq 4, \quad x_1 - x_2 \leq 2, \quad x_1, x_2 \geq 0$

Q.7 Attempt any two of the following.

a) Find $A + B$ for the following membership function:

$$A(x) = \frac{x+1}{2} \quad -1 < x \leq 1$$

$$= \frac{3-x}{2} \quad 1 < x < 3$$

$$= 0 \quad \text{otherwise}$$

$$B(x) = \frac{x-1}{2} \quad 1 < x \leq 3$$

$$= \frac{5-x}{2} \quad 3 < x \leq 5$$

$$= 0 \quad \text{otherwise}$$

b) Solve the Assignment Problem

Job	Machine			
	A	B	C	D
1	18	24	28	32
2	8	13	17	19
3	10	15	19	22

c) Maximize $Z = x_1 - x_2 + 3x_3$ subject to

$$x_1 + x_2 + x_3 \leq 10,$$

$$2x_1 - x_3 \leq 2,$$

$$2x_1 - 2x_2 + 3x_3 \leq 0$$

$$x_1, x_2, x_3 \geq 0$$

Seat No.	
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7) For the fuzzy sets _____.

Elements	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

then set $A \cup B =$ is

- a) $\frac{1}{x_1} + \frac{1}{x_2}$
- b) $\frac{0.9}{x_1} + \frac{0.6}{x_2} + \frac{0.8}{x_3} + \frac{0.9}{x_4} + \frac{0.7}{x_5} + \frac{0.1}{x_6}$
- c) $\frac{0.9}{x_1} + \frac{0.7}{x_2} + \frac{0.8}{x_3} + \frac{0.9}{x_4} + \frac{0.7}{x_5} + \frac{0.1}{x_6}$
- d) $\frac{1}{x_1} + \frac{1}{x_2} \frac{0.2}{x_3} + \frac{0.1}{x_4} + \frac{0.1}{x_5} + \frac{0}{x_6}$
- 8) The number of strips required to Trapezoidal rule is _____.
a) Multiple of 4
b) Multiple of 2
c) Multiple of 6
d) Multiple of 3
- 9) The positive real root of $xe^x = 2$ lies between _____.
a) 2 and 3
b) 1 and 3
c) 1 and 2
d) None of these
- 10) _____ method has Quadratic convergence.
a) Newton Raphson
b) Regula falsi
c) Gaussian quadrature
d) Trapezoidal
- 11) The use of Romberg's method is _____.
a) To solve simultaneous linear equations
b) To find root of linear equation
c) To evaluate definite integration
d) To find eigen values
- 12) Power method is used to find _____.
a) smallest eigen value
b) largest eigen value
c) positive eigen value
d) largest eigen vector
- 13) Gauss Seidal method converges only if the coefficient matrix is _____.
a) Singular
b) Diagonally dominant
c) Upper triangular
d) Non singular
- 14) For the data
- | | | | | | |
|-------|---|------|---|------|---|
| t: | 0 | 0.5 | 1 | 1.5 | 2 |
| F(t): | 0 | 0.25 | 1 | 2.25 | 4 |
- The value of $\int_0^2 f(t)dt$ by Simpson's one third rule is _____.
a) 2.6667
b) 2.6650
c) 2.6675
d) None of these

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – II (BTN03401)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 4) Assume suitable data if necessary.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three from the following. **09**

- Find an approximate positive real root of $3x - \cos x = 1$ by False position method. (Perform 2 iterations).
- Solve by Newton Raphson method $x^3 = 6x - 4$ correct to three decimal places.
- Solve the system of equations by Gauss Elimination method.
 $x + 2y + z = 3, 2x + 3y + 3z = 10, 3x - y + 2z = 13$
- Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using Trapezoidal rule.

Q.3 Attempt any three from the following. **09**

- Evaluate $\sqrt{37}$ by Newton Raphson method correct to four decimal places by taking initial approximation as $x_0 = 6$
- Solve the system of equations by Jacobi's method. (Perform 3 iterations)
 $20x + y - 2z = 17, \quad 3x + 20y - z = -18, \quad 2x - 3y + 20z = 25$
- | | | | | | |
|------|---|---|---|---|---|
| x | : | 2 | 4 | 6 | 8 |
| f(x) | : | 3 | 5 | 6 | 7 |

Then using Simpson's $1/3^{\text{rd}}$ rule, find the value of $\int_2^8 f(x) dx$

- Evaluate $\int_1^{1.2} \int_1^{1.4} \frac{1}{x+y} dx dy$ $h = 0.1, k = 0.1$ by Trapezoidal rule.

Q.4 Attempt any two from the following. **10**

- Evaluate $\int_0^2 \frac{1}{4+x^2} dx$ using Romberg's method with $n = 2$.
- Solve the simultaneous equations $x^2 + y - 11 = 0$ and $y^2 + x - 7 = 0$. the initial approximations $x_0 = 3.5$ and $y_0 = -1.5$ using Newton Raphson method. (Perform two iterations)
- Solve the system of equations by Gauss Siedal method
 $8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z = 35$.
 (Perform four iterations)

Section – II

Q.5 Attempt any three of the following.

09

a) For the fuzzy sets

Elements	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

find $(A \cup B)', A' \cap B'$

b) Evaluate the following

1) $[-1, 2] + [1, 3]$

2) $[-2, 4] - [3, 6]$

3) $[-3, 4] \cdot [-3, 4]$

4) $[-4, 6] / [1, 2]$

c) Define

1) Feasible Solution

2) Basic Feasible Solution

3) Optimum solution

4) Degenerate solution

d) Find I.B.F.S by using Hungarian method

	I	II	III	IV
A	15	14	12	16
B	23	22	25	24
C	31	34	32	33
D	21	32	44	53

Q.6 Attempt any three of the following.

09

a) Determine whether the following fuzzy set is a fuzzy number

$$C(x) = \begin{cases} \tan x & 0 \leq x \leq \pi/4 \\ 0 & \text{otherwise} \end{cases}$$

b) Solve the fuzzy equation $A + X = B$

where $\alpha_A = [\alpha + 4, 6 - \alpha]$ and $\alpha_B = [10 + 10\alpha, 35 - 15\alpha]$

c) For the fuzzy sets

Elements:	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

then find fuzzy set $0.7_A \cap_B$ d) Maximize $Z = 3x_1 + 2x_2$ subject to

$x_1 + x_2 \leq 4, \quad x_1 - x_2 \leq 2, \quad x_1, x_2 \geq 0$

Q.7 Attempt any two of the following.**a)** Find $A + B$ for the following membership function:

$$A(x) = \frac{x+1}{2} \quad -1 < x \leq 1$$

$$= \frac{3-x}{2} \quad 1 < x < 3$$

$$= 0 \quad \text{otherwise}$$

$$B(x) = \frac{x-1}{2} \quad 1 < x \leq 3$$

$$= \frac{5-x}{2} \quad 3 < x \leq 5$$

$$= 0 \quad \text{otherwise}$$

b) Solve the Assignment Problem

Job	Machine			
	A	B	C	D
1	18	24	28	32
2	8	13	17	19
3	10	15	19	22

c) Maximize $Z = x_1 - x_2 + 3x_3$ subject to

$$x_1 + x_2 + x_3 \leq 10,$$

$$2x_1 - x_3 \leq 2,$$

$$2x_1 - 2x_2 + 3x_3 \leq 0$$

$$x_1, x_2, x_3 \geq 0$$

Seat No.	
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Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Instructions:

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.
- 5) Use of non-programmable calculators is allowed.

Marks:14

14

- 1) If A is a fuzzy set defined on $X = \{0, 10\}$ by $A(x) = \frac{1-x}{x+3}$ then equilibrium point is _____.
a) 0
b) 1/2
c) -1/3
d) 1/3
- 2) A variable which does not appear in the basic variable (B) column of simplex table is _____.
a) never equal to zero
b) always equal to zero
c) called a basic variable
d) none
- 3) For fuzzy sets A, B $|A| = 3$ $|B| = 10$, $|A \cap B| = 0.9$ then $S(B, A) =$ _____.
a) 0.09
b) 0.9
c) 0.3
d) 0.99
- 4) For the fuzzy sets _____.

Elements	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

then set $A \cup B =$ is

- $$\begin{aligned} \text{a)} \quad & \frac{1}{x_1} + \frac{1}{x_2} \\ \text{b)} \quad & \frac{0.9}{x_1} + \frac{0.6}{x_2} + \frac{0.8}{x_3} + \frac{0.9}{x_4} + \frac{0.7}{x_5} + \frac{0.1}{x_6} \\ \text{c)} \quad & \frac{0.9}{x_1} + \frac{0.7}{x_2} + \frac{0.8}{x_3} + \frac{0.9}{x_4} + \frac{0.7}{x_5} + \frac{0.1}{x_6} \\ \text{d)} \quad & \frac{1}{x_1} + \frac{1}{x_2} \frac{0.2}{x_3} + \frac{0.1}{x_4} + \frac{0.1}{x_5} + \frac{0}{x_6} \end{aligned}$$

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Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – II (BTN03401)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 4) Assume suitable data if necessary.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three from the following. 09

- Find an approximate positive real root of $3x - \cos x = 1$ by False position method. (Perform 2 iterations).
- Solve by Newton Raphson method $x^3 = 6x - 4$ correct to three decimal places.
- Solve the system of equations by Gauss Elimination method.
 $x + 2y + z = 3, 2x + 3y + 3z = 10, 3x - y + 2z = 13$
- Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using Trapezoidal rule.

Q.3 Attempt any three from the following. 09

- Evaluate $\sqrt{37}$ by Newton Raphson method correct to four decimal places by taking initial approximation as $x_0 = 6$
- Solve the system of equations by Jacobi's method. (Perform 3 iterations)
 $20x + y - 2z = 17, \quad 3x + 20y - z = -18, \quad 2x - 3y + 20z = 25$
- | | | | | | |
|------|---|---|---|---|---|
| x | : | 2 | 4 | 6 | 8 |
| f(x) | : | 3 | 5 | 6 | 7 |

Then using Simpson's 1/3rd rule, find the value of $\int_2^8 f(x) dx$

- Evaluate $\int_1^{1.2} \int_1^{1.4} \frac{1}{x+y} dx dy$ $h = 0.1, k = 0.1$ by Trapezoidal rule.

Q.4 Attempt any two from the following. 10

- Evaluate $\int_0^2 \frac{1}{4+x^2} dx$ using Romberg's method with $n = 2$.
- Solve the simultaneous equations $x^2 + y - 11 = 0$ and $y^2 + x - 7 = 0$. the initial approximations $x_0 = 3.5$ and $y_0 = -1.5$ using Newton Raphson method. (Perform two iterations)
- Solve the system of equations by Gauss Siedal method
 $8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z = 35$.
 (Perform four iterations)

Section – II

Q.5 Attempt any three of the following.

09

a) For the fuzzy sets

Elements	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

find $(A \cup B)', A' \cap B'$

b) Evaluate the following

1) $[-1, 2] + [1, 3]$

2) $[-2, 4] - [3, 6]$

3) $[-3, 4] \cdot [-3, 4]$

4) $[-4, 6] / [1, 2]$

c) Define

1) Feasible Solution

2) Basic Feasible Solution

3) Optimum solution

4) Degenerate solution

d) Find I.B.F.S by using Hungarian method

	I	II	III	IV
A	15	14	12	16
B	23	22	25	24
C	31	34	32	33
D	21	32	44	53

Q.6 Attempt any three of the following.

09

a) Determine whether the following fuzzy set is a fuzzy number

$$C(x) = \begin{cases} \tan x & 0 \leq x \leq \pi/4 \\ 0 & \text{otherwise} \end{cases}$$

b) Solve the fuzzy equation $A + X = B$

where $\alpha_A = [\alpha + 4, 6 - \alpha]$ and $\alpha_B = [10 + 10\alpha, 35 - 15\alpha]$

c) For the fuzzy sets

Elements:	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

then find fuzzy set $0.7_A \cap_B$ d) Maximize $Z = 3x_1 + 2x_2$ subject to

$x_1 + x_2 \leq 4, \quad x_1 - x_2 \leq 2, \quad x_1, x_2 \geq 0$

Q.7 Attempt any two of the following.

a) Find $A + B$ for the following membership function:

$$A(x) = \frac{x+1}{2} \quad -1 < x \leq 1$$

$$= \frac{3-x}{2} \quad 1 < x < 3$$

$$= 0 \quad \text{otherwise}$$

$$B(x) = \frac{x-1}{2} \quad 1 < x \leq 3$$

$$= \frac{5-x}{2} \quad 3 < x \leq 5$$

$$= 0 \quad \text{otherwise}$$

b) Solve the Assignment Problem

Job	Machine			
	A	B	C	D
1	18	24	28	32
2	8	13	17	19
3	10	15	19	22

c) Maximize $Z = x_1 - x_2 + 3x_3$ subject to

$$x_1 + x_2 + x_3 \leq 10,$$

$$2x_1 - x_3 \leq 2,$$

$$2x_1 - 2x_2 + 3x_3 \leq 0$$

$$x_1, x_2, x_3 \geq 0$$

Seat No.	
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Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options. 14

- 1) Gauss Seidal method converges only if the coefficient matrix is _____.
a) Singular
b) Diagonally dominant
c) Upper triangular
d) Non singular
- 2) For the data
t: 0 0.5 1 1.5 2
F(t): 0 0.25 1 2.25 4
The value of $\int_0^2 f(t)dt$ by Simpson's one third rule is _____.
a) 2.6667
b) 2.6650
c) 2.6675
d) None of these
- 3) The α – cut of any fuzzy set is _____.
a) Fuzzy set
b) Ordinary set (Crisp set)
c) Subset of fuzzy set
d) None
- 4) While solving an assignment problem an activity is assigned to a resource with zero opportunity cost the objective is to _____.
a) Reduce the cost of assignment to zero
b) Minimize total cost of an assignment
c) Reduce the cost of that particular assignment to minimum
d) None
- 5) I) Every ordinary set is a fuzzy set.
II) Every fuzzy set is a ordinary set, then
a) Both are true
b) Only I is true
c) Only II is true
d) Both are false
- 6) If A is a fuzzy set defined on $X = \{0, 10\}$ by $A(x) = \frac{1-x}{x+3}$ then equilibrium point is _____.
a) 0
b) 1/2
c) -1/3
d) 1/3

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Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE AND ENGINEERING
Applied Mathematics – II (BTN03401)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 4) Assume suitable data if necessary.
 3) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three from the following. 09

- Find an approximate positive real root of $3x - \cos x = 1$ by False position method. (Perform 2 iterations).
- Solve by Newton Raphson method $x^3 = 6x - 4$ correct to three decimal places.
- Solve the system of equations by Gauss Elimination method.
 $x + 2y + z = 3, 2x + 3y + 3z = 10, 3x - y + 2z = 13$
- Evaluate $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using Trapezoidal rule.

Q.3 Attempt any three from the following. 09

- Evaluate $\sqrt{37}$ by Newton Raphson method correct to four decimal places by taking initial approximation as $x_0 = 6$
- Solve the system of equations by Jacobi's method. (Perform 3 iterations)
 $20x + y - 2z = 17, \quad 3x + 20y - z = -18, \quad 2x - 3y + 20z = 25$
- | | | | | | |
|------|---|---|---|---|---|
| x | : | 2 | 4 | 6 | 8 |
| f(x) | : | 3 | 5 | 6 | 7 |

Then using Simpson's $1/3^{\text{rd}}$ rule, find the value of $\int_2^8 f(x) dx$

- Evaluate $\int_1^{1.2} \int_1^{1.4} \frac{1}{x+y} dx dy$ $h = 0.1, k = 0.1$ by Trapezoidal rule.

Q.4 Attempt any two from the following. 10

- Evaluate $\int_0^2 \frac{1}{4+x^2} dx$ using Romberg's method with $n = 2$.
- Solve the simultaneous equations $x^2 + y - 11 = 0$ and $y^2 + x - 7 = 0$. the initial approximations $x_0 = 3.5$ and $y_0 = -1.5$ using Newton Raphson method. (Perform two iterations)
- Solve the system of equations by Gauss Siedal method
 $8x - 3y + 2z = 20, 4x + 11y - z = 33, 6x + 3y + 12z = 35$.
 (Perform four iterations)

Section – II

Q.5 Attempt any three of the following.

09

a) For the fuzzy sets

Elements	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

find $(A \cup B)', A' \cap B'$

b) Evaluate the following

1) $[-1, 2] + [1, 3]$

2) $[-2, 4] - [3, 6]$

3) $[-3, 4] \cdot [-3, 4]$

4) $[-4, 6] / [1, 2]$

c) Define

1) Feasible Solution

2) Basic Feasible Solution

3) Optimum solution

4) Degenerate solution

d) Find I.B.F.S by using Hungarian method

	I	II	III	IV
A	15	14	12	16
B	23	22	25	24
C	31	34	32	33
D	21	32	44	53

Q.6 Attempt any three of the following.

09

a) Determine whether the following fuzzy set is a fuzzy number

$$C(x) = \begin{cases} \tan x & 0 \leq x \leq \pi/4 \\ 0 & \text{otherwise} \end{cases}$$

b) Solve the fuzzy equation $A + X = B$

where $\alpha_A = [\alpha + 4, 6 - \alpha]$ and $\alpha_B = [10 + 10\alpha, 35 - 15\alpha]$

c) For the fuzzy sets

Elements:	x_1	x_2	x_3	x_4	x_5	x_6
$A(x)$:	0.1	0.6	0.8	0.9	0.7	0.1
$B(x)$:	0.9	0.7	0.5	0.2	0.1	0

then find fuzzy set $0.7_A \cap_B$ d) Maximize $Z = 3x_1 + 2x_2$ subject to

$$x_1 + x_2 \leq 4, \quad x_1 - x_2 \leq 2, \quad x_1, x_2 \geq 0$$

Q.7 Attempt any two of the following.

a) Find $A + B$ for the following membership function:

$$A(x) = \frac{x+1}{2} \quad -1 < x \leq 1$$

$$= \frac{3-x}{2} \quad 1 < x < 3$$

$$= 0 \quad \text{otherwise}$$

$$B(x) = \frac{x-1}{2} \quad 1 < x \leq 3$$

$$= \frac{5-x}{2} \quad 3 < x \leq 5$$

$$= 0 \quad \text{otherwise}$$

b) Solve the Assignment Problem

Job	Machine			
	A	B	C	D
1	18	24	28	32
2	8	13	17	19
3	10	15	19	22

c) Maximize $Z = x_1 - x_2 + 3x_3$ subject to

$$x_1 + x_2 + x_3 \leq 10,$$

$$2x_1 - x_3 \leq 2,$$

$$2x_1 - 2x_2 + 3x_3 \leq 0$$

$$x_1, x_2, x_3 \geq 0$$

Seat No.	
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Max. Marks: 70

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks:14

14

- Page 1 of 12

- 9) If three coins are tossed simultaneously, what is the probability of getting two heads together?
 - a) $3/8$
 - b) $1/8$
 - c) $5/8$
 - d) None of the above
- 10) Clustering is _____ and is example of _____ learning.
 - a) Predictive and supervised
 - b) Predictive and unsupervised
 - c) Descriptive and supervised
 - d) Descriptive and unsupervised
- 11) Classification rules are extracted from _____.
 - a) Decision tree
 - b) Root node
 - c) Branches
 - d) Siblings
- 12) Which of the following properties are characteristic of decision trees?
 - I) High bias
 - II) High variance
 - III) Lack of smoothness of prediction surfaces
 - IV) Unbounded parameter set
 - a) I) & II)
 - b) I) & IV)
 - c) II), III) & IV)
 - d) All of the above
- 13) How to select best hyperparameters in tree based models?
 - a) Measure performance over training data
 - b) Measure performance over validation data
 - c) Both of these
 - d) Random selection of hyper parameters
- 14) Bayes theorem describes the probability of an event, based on prior knowledge of conditions that might be related to the event.
 - a) True
 - b) False

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Machine Learning (BTN03406)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt Any Three. **12**

- a) What Is Machine Learning? Explain with example?
- b) Explain Types of machine Learning.
- c) Explain Mini Batch Gradient Descent in ML.
- d) Explain the term Training, Validating, and Testing with example.

Q.3 Attempt Any Two. **16**

- a) What is machine learning optimization? How do you optimize a machine learning model? Why is optimization important in ML?
- b) Explain in detail Machine Learning Techniques.
- c) Explain in detail Machine Learning Cycle.

Section – II

Q.4 Attempt any Three. **12**

- a) What is model validation in ML and List out its techniques?
- b) What is cross validation?
- c) What is Future Scope of Machine Learning?
- d) Explain Perceptron in Machine Learning.

Q.5 Attempt Any Two. **16**

- a) How Machine Learning Can Help Solving Business Problems?
- b) How does Perceptron work? Explain with its types.
- c) Write a short note on:
 - i) Training ii) Validating iii) Testing iv) Bias and Leakage Traps

Seat No.	
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
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Machine Learning (BTN03406)

Day & Date: Thursday, 30-05-2024
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Max. Marks: 70

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 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options. 14

- 1) What is the purpose of multiple testing in statistical inference?
 - a) Minimize errors
 - b) Minimize false positives
 - c) Minimize false negatives
 - d) All of the mentioned
- 2) If three coins are tossed simultaneously, what is the probability of getting two heads together?
 - a) $3/8$
 - b) $1/8$
 - c) $5/8$
 - d) None of the above
- 3) Clustering is _____ and is example of _____ learning.
 - a) Predictive and supervised
 - b) Predictive and unsupervised
 - c) Descriptive and supervised
 - d) Descriptive and unsupervised
- 4) Classification rules are extracted from _____.
 - a) Decision tree
 - b) Root node
 - c) Branches
 - d) Siblings
- 5) Which of the following properties are characteristic of decision trees?
 - I) High bias
 - II) High variance
 - III) Lack of smoothness of prediction surfaces
 - IV) Unbounded parameter set
 - a) I) & II)
 - b) I) & IV)
 - c) II), III) & IV)
 - d) All of the above
- 6) How to select best hyperparameters in tree based models?
 - a) Measure performance over training data
 - b) Measure performance over validation data
 - c) Both of these
 - d) Random selection of hyper parameters
- 7) Bayes theorem describes the probability of an event, based on prior knowledge of conditions that might be related to the event.
 - a) True
 - b) False

Seat No.	
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Set Q

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
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Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt Any Three. **12**

- a) What Is Machine Learning? Explain with example?
- b) Explain Types of machine Learning.
- c) Explain Mini Batch Gradient Descent in ML.
- d) Explain the term Training, Validating, and Testing with example.

Q.3 Attempt Any Two. **16**

- a) What is machine learning optimization? How do you optimize a machine learning model? Why is optimization important in ML?
- b) Explain in detail Machine Learning Techniques.
- c) Explain in detail Machine Learning Cycle.

Section – II

Q.4 Attempt any Three. **12**

- a) What is model validation in ML and List out its techniques?
- b) What is cross validation?
- c) What is Future Scope of Machine Learning?
- d) Explain Perceptron in Machine Learning.

Q.5 Attempt Any Two. **16**

- a) How Machine Learning Can Help Solving Business Problems?
- b) How does Perceptron work? Explain with its types.
- c) Write a short note on:
 - i) Training ii) Validating iii) Testing iv) Bias and Leakage Traps

Seat No.	
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Marks:14

14

- Page 7 of 12

- 8) _____ is the machine learning algorithms that can be used with unlabeled data.
- a) Regression algorithms
 - b) Clustering algorithms
 - c) Instance-based algorithms
 - d) All of the above
- 9) The unsupervised learning problems can be grouped as _____.
- a) Clustering
 - b) Association
 - c) Both A and B
 - d) None of the above
- 10) What is the output of training process in machine learning?
- a) Null
 - b) Accuracy
 - c) Machine learning model
 - d) Machine learning algorithm
- 11) Data used to build a data mining model.
- a) Training data
 - b) Validation data
 - c) Test data
 - d) Hidden data
- 12) What is the purpose of multiple testing in statistical inference?
- a) Minimize errors
 - b) Minimize false positives
 - c) Minimize false negatives
 - d) All of the mentioned
- 13) If three coins are tossed simultaneously, what is the probability of getting two heads together?
- a) $\frac{3}{8}$
 - b) $\frac{1}{8}$
 - c) $\frac{5}{8}$
 - d) None of the above
- 14) Clustering is _____ and is example of _____ learning.
- a) Predictive and supervised
 - b) Predictive and unsupervised
 - c) Descriptive and supervised
 - d) Descriptive and unsupervised

Seat No.	
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Set R

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Machine Learning (BTN03406)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt Any Three. **12**

- a) What Is Machine Learning? Explain with example?
- b) Explain Types of machine Learning.
- c) Explain Mini Batch Gradient Descent in ML.
- d) Explain the term Training, Validating, and Testing with example.

Q.3 Attempt Any Two. **16**

- a) What is machine learning optimization? How do you optimize a machine learning model? Why is optimization important in ML?
- b) Explain in detail Machine Learning Techniques.
- c) Explain in detail Machine Learning Cycle.

Section – II

Q.4 Attempt any Three. **12**

- a) What is model validation in ML and List out its techniques?
- b) What is cross validation?
- c) What is Future Scope of Machine Learning?
- d) Explain Perceptron in Machine Learning.

Q.5 Attempt Any Two. **16**

- a) How Machine Learning Can Help Solving Business Problems?
- b) How does Perceptron work? Explain with its types.
- c) Write a short note on:
 - i) Training ii) Validating iii) Testing iv) Bias and Leakage Traps

Seat No.	
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Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.

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3) Figures to the right indicates full marks.

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the options.

14

- 1) What is the output of training process in machine learning?
 - a) Null
 - b) Accuracy
 - c) Machine learning model
 - d) Machine learning algorithm
- 2) Data used to build a data mining model.
 - a) Training data
 - b) Validation data
 - c) Test data
 - d) Hidden data
- 3) What is the purpose of multiple testing in statistical inference?
 - a) Minimize errors
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 - c) Minimize false negatives
 - d) All of the mentioned
- 4) If three coins are tossed simultaneously, what is the probability of getting two heads together?
 - a) $3/8$
 - b) $1/8$
 - c) $5/8$
 - d) None of the above
- 5) Clustering is _____ and is example of _____ learning.
 - a) Predictive and supervised
 - b) Predictive and unsupervised
 - c) Descriptive and supervised
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- 6) Classification rules are extracted from _____.
 - a) Decision tree
 - b) Root node
 - c) Branches
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- 7) Which of the following properties are characteristic of decision trees?
 - I) High bias
 - II) High variance
 - III) Lack of smoothness of prediction surfaces
 - IV) Unbounded parameter set
 - a) I) & II)
 - b) I) & IV)
 - c) II), III) & IV)
 - d) All of the above
- 8) How to select best hyperparameters in tree based models?
 - a) Measure performance over training data
 - b) Measure performance over validation data
 - c) Both of these
 - d) Random selection of hyper parameters

- 9) Bayes theorem describes the probability of an event, based on prior knowledge of conditions that might be related to the event.

a) True b) False
- 10) Application of Machine learning is _____.

a) Email filtering b) Sentimental analysis
c) Face recognition d) All of the above
- 11) The categories in which Machine learning approaches can be traditionally categorized are _____.

a) Supervised learning b) Unsupervised learning
c) Reinforcement learning d) All of the above
- 12) In Model based learning methods, an iterative process takes place on the ML models that are built based on various model parameters, called?

a) Mini-batches b) Optimizedparameters
c) Hyperparameters d) Superparameters
- 13) _____ is the machine learning algorithms that can be used with unlabeled data.

a) Regression algorithms b) Clustering algorithms
c) Instance-based algorithms d) All of the above
- 14) The unsupervised learning problems can be grouped as _____.

a) Clustering b) Association
c) Both A and B d) None of the above

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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
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Machine Learning (BTN03406)

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Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Attempt Any Three. **12**

- a) What Is Machine Learning? Explain with example?
- b) Explain Types of machine Learning.
- c) Explain Mini Batch Gradient Descent in ML.
- d) Explain the term Training, Validating, and Testing with example.

Q.3 Attempt Any Two. **16**

- a) What is machine learning optimization? How do you optimize a machine learning model? Why is optimization important in ML?
- b) Explain in detail Machine Learning Techniques.
- c) Explain in detail Machine Learning Cycle.

Section – II

Q.4 Attempt any Three. **12**

- a) What is model validation in ML and List out its techniques?
- b) What is cross validation?
- c) What is Future Scope of Machine Learning?
- d) Explain Perceptron in Machine Learning.

Q.5 Attempt Any Two. **16**

- a) How Machine Learning Can Help Solving Business Problems?
- b) How does Perceptron work? Explain with its types.
- c) Write a short note on:
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Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Mathematics for Data Science (BTN03407)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct answer.

14

- 1) In optimization problem, x is known as _____.
 a) Decision variable b) Constraint
 c) objective function d) None of the above
- 2) If your problem is impossible to find a direct answer for, then it falls into the _____.
 a) Obvious context b) complicated context
 c) Complex context d) disorder
- 3) If all elements of a row or columns is 0, then the value of determinant is _____.
 a) 1 b) 0
 c) 2 d) -1
- 4) Length or magnitude of eigenvectors is equal to _____.
 a) 0 b) 1
 c) -1 d) None of these
- 5) _____ distance is the number of values that are different between two vectors.
 a) Cosine b) Hamming
 c) Euclidian d) None of these
- 6) Correlation is represented in between _____.
 a) 0 to 1 b) -1 to +1
 c) -1 to 0 d) 1 to 100
- 7) The difference between the largest (max()) and smallest (min()) values is known as _____.
 a) Range b) Standard deviation
 c) Variance d) Percentile
- 8) Normal distribution can generate _____ shaped curve.
 a) Bell b) U
 c) V d) None of these

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Mathematics for Data Science (BTN03407)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Answer any three from the following questions. 12**
- What is optimization? Explain components of optimization problem.
 - Write short note on eigen values and eigen vectors.
 - What is variance? Explain with python function.
 - Explain the concept notion of hyper planes.
- Q.3 Solve any One 08**
- List and explain distance measures in data science.
 - List and explain typology of problems in data science.
- Q.4 Define the following terms with python function 08**
- Mean
 - Median
 - Mode
 - Dispersion

Section – II

- Q.5 Solve any Three 12**
- What is confidence interval? Explain.
 - What is hypothesis testing? Explain.
 - What is Bayes theorem? Explain in detail.
 - Write short note on gradient decent method.
- Q.6 Solve any One 08**
- Explain P-hacking in detail.
 - Explain in detail KKT condition.
- Q.7 Explain central limit theorem in detail 08**

Seat No.	
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 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct answer.

14

- 1) Normal distribution can generate _____ shaped curve.
 - a) Bell
 - b) U
 - c) V
 - d) None of these
- 2) An event whose chances of happening is 100 % is called a _____.
 - a) Sure event
 - b) Unsure event
 - c) Dependent event
 - d) None of these
- 3) _____ refers to the misuse and abuse of analysis techniques and results in being fooled by false positive.
 - a) Confidence interval
 - b) Null hypothesis
 - c) Alternate hypothesis
 - d) P-hacking
- 4) _____ testing allows us to make probabilistic statements about population parameters.
 - a) Hypothesis
 - b) Parametric
 - c) Non parametric
 - d) None of these
- 5) _____ Probability is the probability of occurring an event before the collection of new data.
 - a) Prior
 - b) Posterior
 - c) Conditional
 - d) Unconditional
- 6) In the given set of data: 1, 2, 4, 5 the mean of the data set is _____.
 - a) 3
 - b) 5
 - c) 1
 - d) 2
- 7) $A = \begin{bmatrix} 2 & 4 & 3 & 2 \end{bmatrix}$ the trace of matrix is _____.
 - a) 0
 - b) 4
 - c) 7
 - d) 5
- 8) In optimization problem, x is known as _____.
 - a) Decision variable
 - b) Constraint
 - c) objective function
 - d) None of the above

- 9) If your problem is impossible to find a direct answer for, then it falls into the _____.
a) Obvious context b) complicated context
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- 10) If all elements of a row or columns is 0, then the value of determinant is _____.
a) 1 b) 0
c) 2 d) -1
- 11) Length or magnitude of eigenvectors is equal to _____.
a) 0 b) 1
c) -1 d) None of these
- 12) _____ distance is the number of values that are different between two vectors.
a) Cosine b) Hamming
c) Euclidian d) None of these
- 13) Correlation is represented in between _____.
a) 0 to 1 b) -1 to +1
c) -1 to 0 d) 1 to 100
- 14) The difference between the largest ($\max()$) and smallest ($\min()$) values is known as _____.
a) Range b) Standard deviation
c) Variance d) Percentile

Seat No.	
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Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Answer any three from the following questions. 12

- What is optimization? Explain components of optimization problem.
- Write short note on eigen values and eigen vectors.
- What is variance? Explain with python function.
- Explain the concept notion of hyper planes.

Q.3 Solve any One 08

- List and explain distance measures in data science.
- List and explain typology of problems in data science.

Q.4 Define the following terms with python function 08

- Mean
- Median
- Mode
- Dispersion

Section – II

Q.5 Solve any Three 12

- What is confidence interval? Explain.
- What is hypothesis testing? Explain.
- What is Bayes theorem? Explain in detail.
- Write short note on gradient decent method.

Q.6 Solve any One 08

- Explain P-hacking in detail.
- Explain in detail KKT condition.

Q.7 Explain central limit theorem in detail 08

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct answer.

14

- 1) _____ testing allows us to make probabilistic statements about population parameters.
 - a) Hypothesis
 - b) Parametric
 - c) Non parametric
 - d) None of these
- 2) _____ Probability is the probability of occurring an event before the collection of new data.
 - a) Prior
 - b) Posterior
 - c) Conditional
 - d) Unconditional
- 3) In the given set of data: 1, 2, 4, 5 the mean of the data set is _____.
 - a) 3
 - b) 5
 - c) 1
 - d) 2
- 4) $A = \begin{bmatrix} 2 & 4 \\ 3 & 2 \end{bmatrix}$ the trace of matrix is _____.
 - a) 0
 - b) 4
 - c) 7
 - d) 5
- 5) In optimization problem, x is known as _____.
 - a) Decision variable
 - b) Constraint
 - c) objective function
 - d) None of the above
- 6) If your problem is impossible to find a direct answer for, then it falls into the _____.
 - a) Obvious context
 - b) complicated context
 - c) Complex context
 - d) disorder
- 7) If all elements of a row or columns is 0, then the value of determinant is _____.
 - a) 1
 - b) 0
 - c) 2
 - d) -1
- 8) Length or magnitude of eigenvectors is equal to _____.
 - a) 0
 - b) 1
 - c) -1
 - d) None of these

- 9) _____ distance is the number of values that are different between two vectors.
- a) Cosine
 - b) Hamming
 - c) Euclidian
 - d) None of these
- 10) Correlation is represented in between _____.
- a) 0 to 1
 - b) -1 to +1
 - c) -1 to 0
 - d) 1 to 100
- 11) The difference between the largest (max()) and smallest (min()) values is known as _____.
- a) Range
 - b) Standard deviation
 - c) Variance
 - d) Percentile
- 12) Normal distribution can generate _____ shaped curve.
- a) Bell
 - b) U
 - c) V
 - d) None of these
- 13) An event whose chances of happening is 100 % is called a _____.
- a) Sure event
 - b) Unsure event
 - c) Dependent event
 - d) None of these
- 14) _____ refers to the misuse and abuse of analysis techniques and results in being fooled by false positive.
- a) Confidence interval
 - b) Null hypothesis
 - c) Alternate hypothesis
 - d) P-hacking

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Mathematics for Data Science (BTN03407)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Answer any three from the following questions. 12

- What is optimization? Explain components of optimization problem.
- Write short note on eigen values and eigen vectors.
- What is variance? Explain with python function.
- Explain the concept notion of hyper planes.

Q.3 Solve any One 08

- List and explain distance measures in data science.
- List and explain typology of problems in data science.

Q.4 Define the following terms with python function 08

- Mean
- Median
- Mode
- Dispersion

Section – II

Q.5 Solve any Three 12

- What is confidence interval? Explain.
- What is hypothesis testing? Explain.
- What is Bayes theorem? Explain in detail.
- Write short note on gradient decent method.

Q.6 Solve any One 08

- Explain P-hacking in detail.
- Explain in detail KKT condition.

Q.7 Explain central limit theorem in detail 08

Seat No.	
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Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks:14

14

- 1) Correlation is represented in between _____.
a) 0 to 1
b) -1 to +1
c) -1 to 0
d) 1 to 100
- 2) The difference between the largest (max()) and smallest (min()) values is known as _____.
a) Range
b) Standard deviation
c) Variance
d) Percentile
- 3) Normal distribution can generate _____ shaped curve.
a) Bell
b) U
c) V
d) None of these
- 4) An event whose chances of happening is 100 % is called a _____.
a) Sure event
b) Unsure event
c) Dependent event
d) None of these
- 5) _____ refers to the misuse and abuse of analysis techniques and results in being fooled by false positive.
a) Confidence interval
b) Null hypothesis
c) Alternate hypothesis
d) P-hacking
- 6) _____ testing allows us to make probabilistic statements about population parameters.
a) Hypothesis
b) Parametric
c) Non parametric
d) None of these
- 7) _____ Probability is the probability of occurring an event before the collection of new data.
a) Prior
b) Posterior
c) Conditional
d) Unconditional
- 8) In the given set of data: 1, 2, 4, 5 the mean of the data set is _____.
a) 3
b) 5
c) 1
d) 2

- 9) $A = \begin{bmatrix} 2 & 4 & 3 \\ 2 \end{bmatrix}$ the trace of matrix is _____.
a) 0 b) 4
c) 7 d) 5
- 10) In optimization problem, x is known as _____.
a) Decision variable b) Constraint
c) objective function d) None of the above
- 11) If your problem is impossible to find a direct answer for, then it falls into the _____.
a) Obvious context b) complicated context
c) Complex context d) disorder
- 12) If all elements of a row or columns is 0, then the value of determinant is _____.
a) 1 b) 0
c) 2 d) -1
- 13) Length or magnitude of eigenvectors is equal to _____.
a) 0 b) 1
c) -1 d) None of these
- 14) _____ distance is the number of values that are different between two vectors.
a) Cosine b) Hamming
c) Euclidian d) None of these

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Mathematics for Data Science (BTN03407)

Day & Date: Thursday, 30-05-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

- Q.2 Answer any three from the following questions. 12**
- a) What is optimization? Explain components of optimization problem.
 - b) Write short note on eigen values and eigen vectors.
 - c) What is variance? Explain with python function.
 - d) Explain the concept notion of hyper planes.
- Q.3 Solve any One 08**
- a) List and explain distance measures in data science.
 - b) List and explain typology of problems in data science.
- Q.4 Define the following terms with python function 08**
- a) Mean
 - b) Median
 - c) Mode
 - d) Dispersion

Section – II

- Q.5 Solve any Three 12**
- a) What is confidence interval? Explain.
 - b) What is hypothesis testing? Explain.
 - c) What is Bayes theorem? Explain in detail.
 - d) Write short note on gradient decent method.
- Q.6 Solve any One 08**
- a) Explain P-hacking in detail.
 - b) Explain in detail KKT condition.
- Q.7 Explain central limit theorem in detail 08**

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Cryptography (BTN04410)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) Which of the following is not a characteristic of a good hash function?
 - a) Collision resistance
 - b) One-wayness
 - c) Reversibility
 - d) Determinism
- 2) Which of the following modes of operation in DES is used for operating?
 - a) Cipher Feedback Mode (CFB)
 - b) Cipher Block chaining (CBC)
 - c) Electronic code book (ECB)
 - d) Output Feedback Modes (OFB)
- 3) In _____ same keys are implemented for encrypting as well as decrypting the information.
 - a) Symmetric Key Encryption
 - b) Asymmetric Key Encryption
 - c) Asymmetric Key Decryption
 - d) Hash-based Key Encryption
- 4) Using Rivest, Shamir, Adleman cryptosystem with $p=7$ and $q=9$. Encrypt $M=24$ to find ciphertext. The Ciphertext is:
 - a) 42
 - b) 93
 - c) 114
 - d) 103
- 5) Which encryption algorithm is commonly used in PGP (Pretty Good Privacy)?
 - a) RSA
 - b) AES
 - c) Blowfish
 - d) Triple-DES
- 6) The encryption process where same keys are used for encrypting and decrypting the information is known as?
 - a) Symmetric Key Encryption
 - b) Asymmetric Key Encryption
 - c) Both A and B
 - d) None of the above
- 7) Which of the following is a type of digital signature algorithm?
 - a) DSA
 - b) RSA
 - c) ECDSA
 - d) All of the above
- 8) Which of the following is /are offered by the Hash functions?
 - a) Authentication
 - b) Nonrepudiation
 - c) Data Integrity
 - d) All of the above

- 9) Digital Signatures authenticates the sender by appending the original message with the _____ digest.
- a) Decrypted message
 - b) Encrypted message
 - c) Systematic approach
 - d) None of the mentioned above
- 10) Which of the following is not a type of attack on cryptography?
- a) Brute force attack
 - b) Side-channel attack
 - c) Man-in-the-middle attack
 - d) Protocol attack
- 11) Which of the following is a type of message authentication code?
- a) DES
 - b) HMAC
 - c) Blowfish
 - d) RSA
- 12) Shift cipher is also referred to as the _____.
- a) Caesar cipher
 - b) Cipher text
 - c) Shift cipher
 - d) None of the above
- 13) When a hash function is used to provide message authentication, the hash function value is called to as:
- a) Message Field
 - b) Message Digest
 - c) Message Score
 - d) Message Leap
- 14) Which of the following is not a type of key exchange algorithm?
- a) RSA
 - b) Diffie-Hellman
 - c) Elliptic Curve Diffie-Hellman (ECDH)
 - d) Blowfish

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Cryptography (BTN04410)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume data wherever necessary.

Section – I

- Q.2 Attempt any Four. 16**
- a) Write a note on play fair cipher.
 - b) Explain transposition technique with example.
 - c) Explain in detail security attacks.
 - d) Explain the model of network security with diagram.
 - e) Explain the public key distribution using public key authority.
- Q.3 Attempt any Two. 12**
- a) Explain the working of DES with diagram.
 - b) Explain AES key expansion algorithm.
 - c) What are aspects of block cipher design?

Section – II

- Q.4 Attempt any Four. 16**
- a) Explain ingredients of public key cryptosystem.
 - b) What characteristics are needed in a secure hash function?
 - c) What is mutual authentication? Explain in detail.
 - d) Explain Man-in-the-Middle Attack
 - e) Explain different approaches of attacking RSA algorithm.
- Q.5 Attempt any Two. 12**
- a) Explain Secure hash Algorithm.
 - b) Explain requirements of public key cryptography.
 - c) What are the different services provided by a federated identity management Explain?

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Cryptography (BTN04410)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) Which of the following is /are offered by the Hash functions?
 - a) Authentication
 - b) Nonrepudiation
 - c) Data Integrity
 - d) All of the above
- 2) Digital Signatures authenticates the sender by appending the original message with the _____ digest.
 - a) Decrypted message
 - b) Encrypted message
 - c) Systematic approach
 - d) None of the mentioned above
- 3) Which of the following is not a type of attack on cryptography?
 - a) Brute force attack
 - b) Side-channel attack
 - c) Man-in-the-middle attack
 - d) Protocol attack
- 4) Which of the following is a type of message authentication code?
 - a) DES
 - b) HMAC
 - c) Blowfish
 - d) RSA
- 5) Shift cipher is also referred to as the _____.
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 - b) Cipher text
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 - a) RSA
 - b) Diffie-Hellman
 - c) Elliptic Curve Diffie-Hellman (ECDH)
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- 8) Which of the following is not a characteristic of a good hash function?
 - a) Collision resistance
 - b) One-wayness
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- 9) Which of the following modes of operation in DES is used for operating?
a) Cipher Feedback Mode (CFB) b) Cipher Block chaining (CBC)
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- 10) In _____ same keys are implemented for encrypting as well as decrypting the information.
a) Symmetric Key Encryption b) Asymmetric Key Encryption
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- 11) Using Rivest, Shamir, Adleman cryptosystem with $p=7$ and $q=9$. Encrypt $M=24$ to find ciphertext. The Ciphertext is:
a) 42 b) 93
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- 12) Which encryption algorithm is commonly used in PGP (Pretty Good Privacy)?
a) RSA b) AES
c) Blowfish d) Triple-DES
- 13) The encryption process where same keys are used for encrypting and decrypting the information is known as?
a) Symmetric Key Encryption b) Asymmetric Key Encryption
c) Both A and B d) None of the above
- 14) Which of the following is a type of digital signature algorithm?
a) DSA b) RSA
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Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Cryptography (BTN04410)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume data wherever necessary.

Section – I

- Q.2 Attempt any Four. 16**
- a) Write a note on play fair cipher.
 - b) Explain transposition technique with example.
 - c) Explain in detail security attacks.
 - d) Explain the model of network security with diagram.
 - e) Explain the public key distribution using public key authority.
- Q.3 Attempt any Two. 12**
- a) Explain the working of DES with diagram.
 - b) Explain AES key expansion algorithm.
 - c) What are aspects of block cipher design?

Section – II

- Q.4 Attempt any Four. 16**
- a) Explain ingredients of public key cryptosystem.
 - b) What characteristics are needed in a secure hash function?
 - c) What is mutual authentication? Explain in detail.
 - d) Explain Man-in-the-Middle Attack
 - e) Explain different approaches of attacking RSA algorithm.
- Q.5 Attempt any Two. 12**
- a) Explain Secure hash Algorithm.
 - b) Explain requirements of public key cryptography.
 - c) What are the different services provided by a federated identity management Explain?

Seat No.	
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Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) Which of the following is a type of message authentication code?
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c) Blowfish
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c) Shift cipher
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 - c) Man-in-the-middle attack
 - d) Protocol attack

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Cryptography (BTN04410)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
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Section – I

- Q.2 Attempt any Four. 16**
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Section – II

- Q.4 Attempt any Four. 16**
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 - Explain Man-in-the-Middle Attack
 - Explain different approaches of attacking RSA algorithm.
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Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Cryptography (BTN04410)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

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c) Message Score d) Message Leap

- 9)** Which of the following is not a type of key exchange algorithm?
- a) RSA
 - b) Diffie-Hellman
 - c) Elliptic Curve Diffie-Hellman (ECDH)
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 - c) Reversibility
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- 12)** In _____ same keys are implemented for encrypting as well as decrypting the information.
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- 13)** Using Rivest, Shamir, Adleman cryptosystem with $p=7$ and $q=9$. Encrypt $M=24$ to find ciphertext. The Ciphertext is:
- a) 42
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- 14)** Which encryption algorithm is commonly used in PGP (Pretty Good Privacy)?
- a) RSA
 - b) AES
 - c) Blowfish
 - d) Triple-DES

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE & ENGINEERING
Cryptography (BTN04410)

Day & Date: Thursday, 30-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Assume data wherever necessary.

Section – I

- Q.2 Attempt any Four. 16**
- a) Write a note on play fair cipher.
 - b) Explain transposition technique with example.
 - c) Explain in detail security attacks.
 - d) Explain the model of network security with diagram.
 - e) Explain the public key distribution using public key authority.
- Q.3 Attempt any Two. 12**
- a) Explain the working of DES with diagram.
 - b) Explain AES key expansion algorithm.
 - c) What are aspects of block cipher design?

Section – II

- Q.4 Attempt any Four. 16**
- a) Explain ingredients of public key cryptosystem.
 - b) What characteristics are needed in a secure hash function?
 - c) What is mutual authentication? Explain in detail.
 - d) Explain Man-in-the-Middle Attack
 - e) Explain different approaches of attacking RSA algorithm.
- Q.5 Attempt any Two. 12**
- a) Explain Secure hash Algorithm.
 - b) Explain requirements of public key cryptography.
 - c) What are the different services provided by a federated identity management Explain?

**Seat
No.**

Max. Marks: 70

Marks:14

14

- Page 1 of 16

- Page 2 of 16

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Engineering Mathematics – III (BTN06301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three of the following questions.

09

- Solve $(D^3 + D)y = \cos x$
- Solve $(D^2 - 4D + 3)y = e^{2x}x^3$
- Calculate Karl Pearson's coefficient of correlation
 $\Sigma x = 54, \Sigma y = 908, \Sigma x^2 = 332, \Sigma y^2 = 70836, \Sigma xy = 3724, n = 12$
- Find the Fourier half range cosine series of $f(x) = c - x$ $0 < x < c$
- The line of regression of x on y is $7x - 6y + 9 = 0$ and line of regression of y on x is $5y - 4x - 3 = 0$. Find \bar{x}, \bar{y} and r .

Q.3 Attempt any three of the following questions.

09

- Solve $(D^2 + 4)y = x^2$
- Find the Fourier half range sine series of $f(x) = x - x^2$ $0 \leq x \leq 1$
- | | | | | | | |
|-------|-----|----|----|---|---|----------------------------|
| $x :$ | 0 | 1 | 2 | 3 | 4 | |
| $f :$ | 112 | 63 | 20 | 4 | 1 | Fit a Poisson distribution |
- In a sample of 1000 students the mean and standard deviation of marks obtained by the students in a certain test are 14 and 2.5. Assuming the distribution to be normal, find the number of students getting marks between 12 and 15
 (For S.N.V. Z area between $z = 0$ and $z = 0.4$ is 0.1554, For $z = 0$ and $z = 0.8$ is 0.2881)
- Find the Fourier expansion of $f(x) = x$ in $(-1,1)$

Q.4 Attempt any two of the following questions.

10

- Obtain lines of regression from the following data

$x :$	10	14	18	22	26	30
$y :$	18	12	24	6	30	36
- Find the Fourier expansion of $f(x) = x$ $0 < x \leq \pi$
 $= 2\pi - x$ $\pi < x \leq 2\pi$

- c) An electrical circuit consists of an inductance L , a condenser of capacity C and an e.m.f. $E = E_0 \cos wt$ so that the charge Q satisfies the differential equation $\frac{d^2 Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L} \cos wt$

If $w = \frac{1}{\sqrt{LC}}$ & initially $Q = Q_0$ at $t = 0$ & the current is $i = i_0$ at $t = 0$. Show that the charge Q at time t is given by

$$Q = Q_0 \cos wt + \frac{i_0}{w} \sin wt + \frac{E_0}{2Lw} t \sin wt$$

Section – II

Q.5 Attempt any three of the following questions.

09

- Find Laplace transform of $te^{-t} \cos 2t$
- Find $L^{-1} \log \left(\frac{s^2-4}{s(s+1)} \right)$
- Solve by Newton Raphson method $x^4 - x = 10$ correct to four decimal places.
- Find Fourier cosine transform of e^{-2x} $x > 0$
- Find positive real root of $\cos x = xe^x$ (Perform 2 iterations)

Q.6 Attempt any three of the following questions.

09

- Evaluate $\int_0^\infty \frac{\sin 2t}{t} dt$ by using Laplace Transform.
- Find Laplace transform of $f(t) = \frac{2t}{3}$ $0 < t < 3$ where $f(t)$ is a periodic function with period 3
- Express the function $f(x) = \begin{cases} \pi/2, & 0 < x < \pi \\ 0 & x > \pi \end{cases}$ as a Fourier sine integral
- Evaluate $\int_0^5 \frac{1}{4x+5} dx$ using $n = 5$ by Trapezoidal rule.
- Evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ using Gaussian quadrature method $n = 3$

Q.7 Attempt any two of the following questions.

10

- Find $L^{-1} \left(\frac{s}{(s^2+9)(s^2+4)} \right)$ by Convolution theorem.
- Find $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using i) Simpson's 1/3rd rule ii) Simpson's 3/8th rule
- Find Fourier transform of $f(x) = \begin{cases} 1 & |x| < k \\ 0 & |x| > k \end{cases}$ and
hence evaluate i) $\int_{-\infty}^{\infty} \frac{\sin sk \cdot \cos sk}{s} ds$ ii) $\int_{-\infty}^{\infty} \frac{\sin ks}{s} ds$

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Engineering Mathematics – III (BTN06301)

Day & Date: Monday, 13-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) Use of non-programmable calculators is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.**14**

1) $L^{-1} \left\{ \frac{1}{(s+2)^m} \right\} = \underline{\hspace{2cm}}.$

a) $\frac{e^{2t} t^m}{m!}$

b) $\frac{e^{-2t} t^m}{\Gamma m}$

c) $\frac{e^{-2t} t^m}{\Gamma m + 1}$

d) none

2) Laplace transform of a unit impulse function $\delta(t)$ is $\underline{\hspace{2cm}}.$

a) s

b) 0

c) e^{-s}

d) 1

3)

$x :$	2	4	6	8
$f(x):$	3	5	6	7

Then using Trapezoidal rule, the value of $\int_2^8 f(x) dx$ is $\underline{\hspace{2cm}}.$

a) 18

b) 25

c) 16

d) 32

4) $\underline{\hspace{2cm}}$ method has Quadratic convergence.

a) Newton Raphson

b) Regula falsi

c) Gaussian quadrature

d) Trapezoidal

5) A root of equation $x - \cos x = 0$ lies between $\underline{\hspace{2cm}}.$

a) 1 and 2

b) 2 and 3

c) 0 and 1

d) none

6) If $F_s(\lambda) = e^{-\lambda}$ then the function $f(x) = \underline{\hspace{2cm}}.$

a) $\frac{2}{\sqrt{1+x^2}}$

b) $\frac{\pi}{1+x^2}$

c) $\sqrt{\frac{2}{\pi}} \frac{1}{1+x^2}$

d) None

- 7) The Fourier cosine integral form of $f(x)$ is _____.
 a) $\int_0^\infty \cos \lambda t \int_0^\infty f(t) \cos \lambda t \, dt \, d\lambda$ b) $\int_0^\infty f(t) \cos \lambda t \, dt$
 c) $\frac{2}{\pi} \int_0^\infty \cos \lambda t \int_0^\infty f(t) \cos \lambda t \, dt \, d\lambda$ d) None
- 8) $\frac{1}{D+a} x$ is equal to _____.
 a) $\int x e^{ax} dx$ b) $\int x e^{-ax} dx$
 c) $e^{ax} \int x e^{-ax} dx$ d) $e^{-ax} \int x e^{ax} dx$
- 9) The General Solution of $\frac{d^4 y}{dx^4} - \frac{d^2 y}{dx^2} = 0$ is _____.
 a) $c_1 + c_2 x + c_3 e^x + c_4 e^{-x}$
 b) $c_1 e^x + c_2 e^{-x}$
 c) $c_1 x + c_2 x^2 + (c_3 + c_4 x) e^x$
 d) $(c_1 + c_2 x) e^x$
- 10) If $f(x) = x^2$ is expanded as Fourier cosine series $(0, \pi)$ then the constant term is _____.
 a) $\frac{\pi^2}{3}$ b) $\frac{2\pi^2}{3}$
 c) $\frac{3\pi^2}{2}$ d) $\frac{\pi^3}{3}$
- 11) The function can be expanded in Fourier series if it satisfies _____.
 a) Fourier conditions b) Euler's conditions
 c) Riemann's conditions d) Dirichlet's conditions
- 12) If $z = \frac{x-20}{5}$ then mean and standard deviation are respectively _____.
 a) 5,20 b) 20,5
 c) 10,5 d) 5,10
- 13) For a binomial distribution the mean is 12 and variance is 4 then n,p,q are _____.
 a) 18,2/3,1/3 b) 16,1/3,2/3
 c) 18,1/3,2/3 d) 16,1/3,2/3
- 14) If $b_{yx} = \frac{5}{18}, b_{xy} = \frac{8}{5}$ then $r =$ _____.
 a) 2/5 b) 1/2
 c) 2/3 d) 3/2

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Engineering Mathematics – III (BTN06301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three of the following questions.

09

- Solve $(D^3 + D)y = \cos x$
- Solve $(D^2 - 4D + 3)y = e^{2x}x^3$
- Calculate Karl Pearson's coefficient of correlation
 $\Sigma x = 54, \Sigma y = 908, \Sigma x^2 = 332, \Sigma y^2 = 70836, \Sigma xy = 3724, n = 12$
- Find the Fourier half range cosine series of $f(x) = c - x$ $0 < x < c$
- The line of regression of x on y is $7x - 6y + 9 = 0$ and line of regression of y on x is $5y - 4x - 3 = 0$. Find \bar{x}, \bar{y} and r .

Q.3 Attempt any three of the following questions.

09

- Solve $(D^2 + 4)y = x^2$
- Find the Fourier half range sine series of $f(x) = x - x^2$ $0 \leq x \leq 1$
- | | | | | | | |
|-------|-----|----|----|---|---|----------------------------|
| $x :$ | 0 | 1 | 2 | 3 | 4 | |
| $f :$ | 112 | 63 | 20 | 4 | 1 | Fit a Poisson distribution |
- In a sample of 1000 students the mean and standard deviation of marks obtained by the students in a certain test are 14 and 2.5. Assuming the distribution to be normal, find the number of students getting marks between 12 and 15
 (For S.N.V. Z area between $z = 0$ and $z = 0.4$ is 0.1554, For $z = 0$ and $z = 0.8$ is 0.2881)
- Find the Fourier expansion of $f(x) = x$ in $(-1,1)$

Q.4 Attempt any two of the following questions.

10

- Obtain lines of regression from the following data

$x :$	10	14	18	22	26	30
$y :$	18	12	24	6	30	36
- Find the Fourier expansion of $f(x) = x$ $0 < x \leq \pi$
 $= 2\pi - x$ $\pi < x \leq 2\pi$

- c) An electrical circuit consists of an inductance L , a condenser of capacity C and an e.m.f. $E = E_0 \cos wt$ so that the charge Q satisfies the differential equation $\frac{d^2 Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L} \cos wt$

If $w = \frac{1}{\sqrt{LC}}$ & initially $Q = Q_0$ at $t = 0$ & the current is $i = i_0$ at $t = 0$. Show that the charge Q at time t is given by

$$Q = Q_0 \cos wt + \frac{i_0}{w} \sin wt + \frac{E_0}{2Lw} t \sin wt$$

Section – II

Q.5 Attempt any three of the following questions.

09

- Find Laplace transform of $te^{-t} \cos 2t$
- Find $L^{-1} \log \left(\frac{s^2-4}{s(s+1)} \right)$
- Solve by Newton Raphson method $x^4 - x = 10$ correct to four decimal places.
- Find Fourier cosine transform of $e^{-2x} \quad x > 0$
- Find positive real root of $\cos x = xe^x$ (Perform 2 iterations)

Q.6 Attempt any three of the following questions.

09

- Evaluate $\int_0^\infty \frac{\sin 2t}{t} dt$ by using Laplace Transform.
- Find Laplace transform of $f(t) = \frac{2t}{3} \quad 0 < t < 3$ where $f(t)$ is a periodic function with period 3
- Express the function $f(x) = \begin{cases} \pi/2, & 0 < x < \pi \\ 0 & x > \pi \end{cases}$ as a Fourier sine integral
- Evaluate $\int_0^5 \frac{1}{4x+5} dx$ using $n = 5$ by Trapezoidal rule.
- Evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ using Gaussian quadrature method $n = 3$

Q.7 Attempt any two of the following questions.

10

- Find $L^{-1} \left(\frac{s}{(s^2+9)(s^2+4)} \right)$ by Convolution theorem.
- Find $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using i) Simpson's 1/3rd rule ii) Simpson's 3/8th rule
- Find Fourier transform of $f(x) = \begin{cases} 1 & |x| < k \\ 0 & |x| > k \end{cases}$ and
hence evaluate i) $\int_{-\infty}^{\infty} \frac{\sin sk \cdot \cos sk}{s} ds$ ii) $\int_{-\infty}^{\infty} \frac{\sin ks}{s} ds$

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Engineering Mathematics – III (BTN06301)

Day & Date: Monday, 13-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Assume suitable data if necessary.
 5) Use of non-programmable calculators is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options.

14

- 1) _____ method has Quadratic convergence.
 - a) Newton Raphson
 - b) Regula falsi
 - c) Gaussian quadrature
 - d) Trapezoidal
- 2) A root of equation $x - \cos x = 0$ lies between _____.
 - a) 1 and 2
 - b) 2 and 3
 - c) 0 and 1
 - d) none
- 3) If $F_s(\lambda) = e^{-\lambda}$ then the function $f(x) =$ _____.
 - a) $\frac{2}{\sqrt{1+x^2}}$
 - b) $\frac{\pi}{1+x^2}$
 - c) $\sqrt{\frac{2}{\pi}} \frac{1}{1+x^2}$
 - d) None
- 4) The Fourier cosine integral form of $f(x)$ is _____.
 - a) $\int_0^\infty \cos \lambda t \int_0^\infty f(t) \cos \lambda t dt d\lambda$
 - b) $\int_0^\infty f(t) \cos \lambda t dt$
 - c) $\frac{2}{\pi} \int_0^\infty \cos \lambda t \int_0^\infty f(t) \cos \lambda t dt d\lambda$
 - d) None
- 5) $\frac{1}{D+a} x$ is equal to _____.
 - a) $\int x e^{ax} dx$
 - b) $\int x e^{-ax} dx$
 - c) $e^{ax} \int x e^{-ax} dx$
 - d) $e^{-ax} \int x e^{ax} dx$

- 6) The General Solution of $\frac{d^4y}{dx^4} - \frac{d^2y}{dx^2} = 0$ is _____.
 a) $c_1 + c_2x + c_3e^x + c_4e^{-x}$
 b) $c_1e^x + c_2e^{-x}$
 c) $c_1x + c_2x^2 + (c_3 + c_4x)e^x$
 d) $(c_1 + c_2x)e^x$
- 7) If $f(x) = x^2$ is expanded as Fourier cosine series $(0, \pi)$ then the constant term is _____.
 a) $\frac{\pi^2}{3}$
 b) $\frac{2\pi^2}{3}$
 c) $\frac{3\pi^2}{2}$
 d) $\frac{\pi^3}{3}$
- 8) The function can be expanded in Fourier series if it satisfies _____.
 a) Fourier conditions
 b) Euler's conditions
 c) Riemann's conditions
 d) Dirichlet's conditions
- 9) If $z = \frac{x-20}{5}$ then mean and standard deviation are respectively _____.
 a) 5,20
 b) 20,5
 c) 10,5
 d) 5,10
- 10) For a binomial distribution the mean is 12 and variance is 4 then n,p,q are _____.
 a) 18,2/3,1/3
 b) 16,1/3,2/3
 c) 18,1/3,2/3
 d) 16,1/3,2/3
- 11) If $b_{yx} = \frac{5}{18}, b_{xy} = \frac{8}{5}$ then $r =$ _____.
 a) $2/5$
 b) $1/2$
 c) $2/3$
 d) $3/2$
- 12) $L^{-1}\left\{\frac{1}{(s+2)^m}\right\} =$ _____.
 a) $\frac{e^{2t}t^m}{m!}$
 b) $\frac{e^{-2t}t^m}{\Gamma m}$
 c) $\frac{e^{-2t}t^m}{\Gamma m + 1}$
 d) none
- 13) Laplace transform of a unit impulse function $\delta(t)$ is _____.
 a) s
 b) 0
 c) e^{-s}
 d) 1
- 14)

x :	2	4	6	8
f(x):	3	5	6	7

 Then using Trapezoidal rule, the value of $\int_2^8 f(x)dx$ is _____.
 a) 18
 b) 25
 c) 16
 d) 32

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Engineering Mathematics – III (BTN06301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three of the following questions.

09

- Solve $(D^3 + D)y = \cos x$
- Solve $(D^2 - 4D + 3)y = e^{2x}x^3$
- Calculate Karl Pearson's coefficient of correlation
 $\Sigma x = 54, \Sigma y = 908, \Sigma x^2 = 332, \Sigma y^2 = 70836, \Sigma xy = 3724, n = 12$
- Find the Fourier half range cosine series of $f(x) = c - x$ $0 < x < c$
- The line of regression of x on y is $7x - 6y + 9 = 0$ and line of regression of y on x is $5y - 4x - 3 = 0$. Find \bar{x}, \bar{y} and r .

Q.3 Attempt any three of the following questions.

09

- Solve $(D^2 + 4)y = x^2$
- Find the Fourier half range sine series of $f(x) = x - x^2$ $0 \leq x \leq 1$
- | | | | | | | |
|-------|-----|----|----|---|---|----------------------------|
| $x :$ | 0 | 1 | 2 | 3 | 4 | |
| $f :$ | 112 | 63 | 20 | 4 | 1 | Fit a Poisson distribution |
- In a sample of 1000 students the mean and standard deviation of marks obtained by the students in a certain test are 14 and 2.5. Assuming the distribution to be normal, find the number of students getting marks between 12 and 15
 (For S.N.V. Z area between $z = 0$ and $z = 0.4$ is 0.1554, For $z = 0$ and $z = 0.8$ is 0.2881)
- Find the Fourier expansion of $f(x) = x$ in $(-1,1)$

Q.4 Attempt any two of the following questions.

10

- Obtain lines of regression from the following data

$x :$	10	14	18	22	26	30
$y :$	18	12	24	6	30	36
- Find the Fourier expansion of $f(x) = x$ $0 < x \leq \pi$
 $= 2\pi - x$ $\pi < x \leq 2\pi$

- c) An electrical circuit consists of an inductance L , a condenser of capacity C and an e.m.f. $E = E_0 \cos wt$ so that the charge Q satisfies the differential equation $\frac{d^2 Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L} \cos wt$

If $w = \frac{1}{\sqrt{LC}}$ & initially $Q = Q_0$ at $t = 0$ & the current is $i = i_0$ at $t = 0$. Show that the charge Q at time t is given by

$$Q = Q_0 \cos wt + \frac{i_0}{w} \sin wt + \frac{E_0}{2Lw} t \sin wt$$

Section – II

Q.5 Attempt any three of the following questions.

09

- Find Laplace transform of $te^{-t} \cos 2t$
- Find $L^{-1} \log \left(\frac{s^2-4}{s(s+1)} \right)$
- Solve by Newton Raphson method $x^4 - x = 10$ correct to four decimal places.
- Find Fourier cosine transform of $e^{-2x} \quad x > 0$
- Find positive real root of $\cos x = xe^x$ (Perform 2 iterations)

Q.6 Attempt any three of the following questions.

09

- Evaluate $\int_0^\infty \frac{\sin 2t}{t} dt$ by using Laplace Transform.
- Find Laplace transform of $f(t) = \frac{2t}{3} \quad 0 < t < 3$ where $f(t)$ is a periodic function with period 3
- Express the function $f(x) = \begin{cases} \pi/2, & 0 < x < \pi \\ 0 & x > \pi \end{cases}$ as a Fourier sine integral
- Evaluate $\int_0^5 \frac{1}{4x+5} dx$ using $n = 5$ by Trapezoidal rule.
- Evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ using Gaussian quadrature method $n = 3$

Q.7 Attempt any two of the following questions.

10

- Find $L^{-1} \left(\frac{s}{(s^2+9)(s^2+4)} \right)$ by Convolution theorem.
- Find $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using i) Simpson's 1/3rd rule ii) Simpson's 3/8th rule
- Find Fourier transform of $f(x) = \begin{cases} 1 & |x| < k \\ 0 & |x| > k \end{cases}$ and
hence evaluate i) $\int_{-\infty}^{\infty} \frac{\sin sk \cdot \cos sk}{s} ds$ ii) $\int_{-\infty}^{\infty} \frac{\sin ks}{s} ds$

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Engineering Mathematics – III (BTN06301)

Day & Date: Monday, 13-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Assume suitable data if necessary.
 4) Use of non-programmable calculator is allowed.

Section – I

Q.2 Attempt any three of the following questions.

09

- Solve $(D^3 + D)y = \cos x$
- Solve $(D^2 - 4D + 3)y = e^{2x}x^3$
- Calculate Karl Pearson's coefficient of correlation
 $\Sigma x = 54, \Sigma y = 908, \Sigma x^2 = 332, \Sigma y^2 = 70836, \Sigma xy = 3724, n = 12$
- Find the Fourier half range cosine series of $f(x) = c - x$ $0 < x < c$
- The line of regression of x on y is $7x - 6y + 9 = 0$ and line of regression of y on x is $5y - 4x - 3 = 0$. Find \bar{x}, \bar{y} and r .

Q.3 Attempt any three of the following questions.

09

- Solve $(D^2 + 4)y = x^2$
- Find the Fourier half range sine series of $f(x) = x - x^2$ $0 \leq x \leq 1$
- | | | | | | | |
|-------|-----|----|----|---|---|----------------------------|
| $x :$ | 0 | 1 | 2 | 3 | 4 | |
| $f :$ | 112 | 63 | 20 | 4 | 1 | Fit a Poisson distribution |
- In a sample of 1000 students the mean and standard deviation of marks obtained by the students in a certain test are 14 and 2.5. Assuming the distribution to be normal, find the number of students getting marks between 12 and 15
 (For S.N.V. Z area between $z = 0$ and $z = 0.4$ is 0.1554, For $z = 0$ and $z = 0.8$ is 0.2881)
- Find the Fourier expansion of $f(x) = x$ in $(-1,1)$

Q.4 Attempt any two of the following questions.

10

- Obtain lines of regression from the following data

$x :$	10	14	18	22	26	30
$y :$	18	12	24	6	30	36
- Find the Fourier expansion of $f(x) = x$ $0 < x \leq \pi$
 $= 2\pi - x$ $\pi < x \leq 2\pi$

- c) An electrical circuit consists of an inductance L , a condenser of capacity C and an e.m.f. $E = E_0 \cos wt$ so that the charge Q satisfies the differential equation $\frac{d^2 Q}{dt^2} + \frac{Q}{LC} = \frac{E_0}{L} \cos wt$

If $w = \frac{1}{\sqrt{LC}}$ & initially $Q = Q_0$ at $t = 0$ & the current is $i = i_0$ at $t = 0$. Show that the charge Q at time t is given by

$$Q = Q_0 \cos wt + \frac{i_0}{w} \sin wt + \frac{E_0}{2Lw} t \sin wt$$

Section – II

Q.5 Attempt any three of the following questions.

09

- Find Laplace transform of $te^{-t} \cos 2t$
- Find $L^{-1} \log \left(\frac{s^2-4}{s(s+1)} \right)$
- Solve by Newton Raphson method $x^4 - x = 10$ correct to four decimal places.
- Find Fourier cosine transform of $e^{-2x} \quad x > 0$
- Find positive real root of $\cos x = xe^x$ (Perform 2 iterations)

Q.6 Attempt any three of the following questions.

09

- Evaluate $\int_0^\infty \frac{\sin 2t}{t} dt$ by using Laplace Transform.
- Find Laplace transform of $f(t) = \frac{2t}{3} \quad 0 < t < 3$ where $f(t)$ is a periodic function with period 3
- Express the function $f(x) = \begin{cases} \pi/2, & 0 < x < \pi \\ 0 & x > \pi \end{cases}$ as a Fourier sine integral
- Evaluate $\int_0^5 \frac{1}{4x+5} dx$ using $n = 5$ by Trapezoidal rule.
- Evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ using Gaussian quadrature method $n = 3$

Q.7 Attempt any two of the following questions.

10

- Find $L^{-1} \left(\frac{s}{(s^2+9)(s^2+4)} \right)$ by Convolution theorem.
- Find $\int_0^6 \frac{1}{1+x^2} dx$ $n = 6$ using i) Simpson's 1/3rd rule ii) Simpson's 3/8th rule
- Find Fourier transform of $f(x) = \begin{cases} 1 & |x| < k \\ 0 & |x| > k \end{cases}$ and
hence evaluate i) $\int_{-\infty}^{\infty} \frac{\sin sk \cdot \cos sk}{s} ds$ ii) $\int_{-\infty}^{\infty} \frac{\sin ks}{s} ds$

Seat No.	
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Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Tick the correct option

14

- 1) The Parameter independent of operating point ('Q' point) of transistor circuit is _____.
a) I_c
b) I_B
c) β
d) I_E
- 2) Input and output resistance of transistor CB amplifier is _____ & _____ respectively.
a) Low & low
b) High & high
c) Low & high
d) High & low
- 3) The Early effect & Punch through effect are related with _____.
a) JEFT
b) BJT
c) Zener Diode
d) Transformer
- 4) If gain of cascaded amplifier is 100 dB, for desired 20 volt output, find the value of input signal?
a) 1 mV
b) 2 mV
c) 0.1 mV
d) 0.2 mV
- 5) When two amplifiers are Cascaded that will result in _____.
a) Reduction in gain increase in BW
b) Increase in gain decrease in BW
c) Reduction in gain reduction in BW
d) None of these
- 6) The phase difference between input signal & feedback signal of negative feedback amplifier is _____ degrees.
a) 360
b) 180
c) 90
d) 0
- 7) When voltage Shunt negative feedback is applied to an amplifier, its input impedance and output impedance _____.
a) Decreases, Decreases
b) Decreases, Increases
c) Remains the same
d) Increases, Increases

- 8) If $R_C/R = 1$ then frequency of oscillation for RC phase shift oscillator is ____.

a) $1/2\pi RC$ b) $1/2\pi RC\sqrt{10}$

c) $1/2\pi\sqrt{RC}$ d) $1/RC$
- 9) The Wein bridge oscillator is a ____.

a) Microwave oscillator b) RF oscillator

c) VHF oscillator d) Audio frequency oscillator
- 10) If conduction angle of a transistor in power amplifier is less than 180 degree of the input signal, then it is _____ operation.

a) class A b) class B

c) class C d) None of these
- 11) The maximum efficiency of class A power amplifier with direct coupled load is ____.

a) 50% b) 25%

c) 75.5% d) 100%
- 12) MOSFET operates as constant resistor in _____ region.

a) Ohmic b) Pinch off

c) Active d) None of these
- 13) The region in which $V_{ds} > V_p$ & $V_{gs} > V_p$ for N channel JFET is called as ____

a) Ohmic region b) Cutoff region

c) Pinch off region d) None of these
- 14) For N channel E- MOSFET, V_{gs} should be _____ with positive V_{ds} so that MOSFET will conduct.

a) Positive b) Negative

c) Either positive or negative d) None of these

Seat No.	
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Set

P

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Electronic Circuit Analysis and Design (BTN06302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data if required.
 4) Draw neat diagram whenever necessary.

Section – I

Q.2 Attempt any Four: **16**

- Explain input & output characteristics of BJT in common emitter configuration.
- Derive H-parameter model & define H parameters for transistor in CE circuit configuration.
- Describe Q point stabilization in transistor voltage divider biasing circuit.
- Explain different types of coupling used in the multistage amplifiers.
- Describe the advantages of negative feedback in the feedback amplifiers.

Q.3 Attempt any Two: **12**

- Derive expression for stability factor of transistor CE voltage divider biasing circuit & comment on Stability of operating point of the circuit.
- A transistor CE amplifier uses $R_L = 2.7 \text{ K}\Omega$. The H parameters are $h_{ie} = 4.5 \text{ K}\Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 330$, $h_{oe} = 30 \mu\text{S}$, $R_s = 0 \Omega$. Calculate A_i , A_v , R_i , R_o .
- Describe the different feedback amplifier topologies or types of feedback connections & their significance with neat block diagrams.

Section – II

Q.4 Attempt any Four: **16**

- With the help of block diagram, explain working principle of oscillator & state Barkhausen's criteria.
- Draw & explain basic class B power amplifier with output waveforms.
- Explain the operation of UJT relaxation oscillator with circuit diagram & waveforms.
- For Common Source JFET amplifier with $R_d = 20 \text{ K}\Omega$ & $R_g = 100 \text{ M}\Omega$, $g_m = 2 \text{ mA/V}$, $r_d = 40 \text{ K}\Omega$. Calculate Voltage gain A_v , input resistance R_i & output resistance R_o .
- Draw construction diagram of N channel E-MOSFET and explain it's working.

Q.5 Attempt any Two: **12**

- Design transistorized RC phase shift oscillator for output frequency of 10 KHz, at the Peak voltage of 5 volt. (Assume suitable data)
- Derive expressions for input resistance, output resistance, and voltage gain for CS JFET amplifier.
- Derive the equation for conversion efficiency for class A transformer coupled power amplifier.

Seat No.	
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Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if required.
- 5) Draw neat diagrams whenever necessary.

Marks: 14

14

- 1) If $R_c/R = 1$ then frequency of oscillation for RC phase shift oscillator is ____.

a) $1/2\pi RC$ b) $1/2\pi RC\sqrt{10}$

c) $1/2\pi\sqrt{RC}$ d) $1/RC$
- 2) The Wein bridge oscillator is a ____.

a) Microwave oscillator b) RF oscillator

c) VHF oscillator d) Audio frequency oscillator
- 3) If conduction angle of a transistor in power amplifier is less than 180 degree of the input signal, then it is ____ operation.

a) class A b) class B

c) class C d) None of these
- 4) The maximum efficiency of class A power amplifier with direct coupled load is ____.

a) 50% b) 25%

c) 75.5% d) 100%
- 5) MOSFET operates as constant resistor in ____ region.

a) Ohmic b) Pinch off

c) Active d) None of these
- 6) The region in which $V_{ds} > V_p$ & $V_{gs} > V_p$ for N channel JFET is called as ____

a) Ohmic region b) Cutoff region

c) Pinch off region d) None of these
- 7) For N channel E- MOSFET, V_{gs} should be ____ with positive V_{ds} so that MOSFET will conduct.

a) Positive b) Negative

c) Either positive or negative d) None of these

- 8) The Parameter independent of operating point ('Q' point) of transistor circuit is _____.
a) I_c b) I_B
c) β d) I_E
- 9) Input and output resistance of transistor CB amplifier is _____ & _____ respectively.
a) Low & low b) High & high
c) Low & high d) High & low
- 10) The Early effect & Punch through effect are related with _____.
a) JEFT b) BJT
c) Zener Diode d) Transformer
- 11) If voltage gain of cascaded amplifier is 100 dB, for desired 20 volt output, find the value of input signal?
a) 1 mV b) 2 mV
c) 0.1 mV d) 0.2 mV
- 12) When two amplifiers are Cascaded that will result in _____.
a) Reduction in gain increase in BW
b) Increase in gain decrease in BW
c) Reduction in gain reduction in BW
d) None of these
- 13) The phase difference between input signal & feedback signal of negative feedback amplifier is _____ degrees.
a) 360 b) 180
c) 90 d) 0
- 14) When voltage Shunt negative feedback is applied to an amplifier, its input impedance and output impedance _____.
a) Decreases, Decreases b) Decreases, Increases
c) Remains the same d) Increases, Increases

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Electronic Circuit Analysis and Design (BTN06302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data if required.
 4) Draw neat diagram whenever necessary.

Section – I

Q.2 Attempt any Four: 16

- Explain input & output characteristics of BJT in common emitter configuration.
- Derive H-parameter model & define H parameters for transistor in CE circuit configuration.
- Describe Q point stabilization in transistor voltage divider biasing circuit.
- Explain different types of coupling used in the multistage amplifiers.
- Describe the advantages of negative feedback in the feedback amplifiers.

Q.3 Attempt any Two: 12

- Derive expression for stability factor of transistor CE voltage divider biasing circuit & comment on Stability of operating point of the circuit.
- A transistor CE amplifier uses $R_L = 2.7 \text{ K}\Omega$. The H parameters are $h_{ie} = 4.5 \text{ K}\Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 330$, $h_{oe} = 30 \mu\text{S}$, $R_s = 0 \Omega$. Calculate A_i , A_v , R_i , R_o .
- Describe the different feedback amplifier topologies or types of feedback connections & their significance with neat block diagrams.

Section – II

Q.4 Attempt any Four: 16

- With the help of block diagram, explain working principle of oscillator & state Barkhausen's criteria.
- Draw & explain basic class B power amplifier with output waveforms.
- Explain the operation of UJT relaxation oscillator with circuit diagram & waveforms.
- For Common Source JFET amplifier with $R_d = 20 \text{ K}\Omega$ & $R_g = 100 \text{ M}\Omega$, $g_m = 2 \text{ mA/V}$, $r_d = 40 \text{ K}\Omega$. Calculate Voltage gain A_v , input resistance R_i & output resistance R_o .
- Draw construction diagram of N channel E-MOSFET and explain it's working.

Q.5 Attempt any Two: 12

- Design transistorized RC phase shift oscillator for output frequency of 10 KHz, at the Peak voltage of 5 volt. (Assume suitable data)
- Derive expressions for input resistance, output resistance, and voltage gain for CS JFET amplifier.
- Derive the equation for conversion efficiency for class A transformer coupled power amplifier.

Seat No.	
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Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if required.
- 5) Draw neat diagrams whenever necessary.

Marks: 14

14

- Page 7 of 12

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Electronic Circuit Analysis and Design (BTN06302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data if required.
 4) Draw neat diagram whenever necessary.

Section – I

Q.2 Attempt any Four: 16

- Explain input & output characteristics of BJT in common emitter configuration.
- Derive H-parameter model & define H parameters for transistor in CE circuit configuration.
- Describe Q point stabilization in transistor voltage divider biasing circuit.
- Explain different types of coupling used in the multistage amplifiers.
- Describe the advantages of negative feedback in the feedback amplifiers.

Q.3 Attempt any Two: 12

- Derive expression for stability factor of transistor CE voltage divider biasing circuit & comment on Stability of operating point of the circuit.
- A transistor CE amplifier uses $R_L = 2.7 \text{ K}\Omega$. The H parameters are $h_{ie} = 4.5 \text{ K}\Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 330$, $h_{oe} = 30 \mu\text{S}$, $R_s = 0 \Omega$. Calculate A_i , A_v , R_i , R_o .
- Describe the different feedback amplifier topologies or types of feedback connections & their significance with neat block diagrams.

Section – II

Q.4 Attempt any Four: 16

- With the help of block diagram, explain working principle of oscillator & state Barkhausen's criteria.
- Draw & explain basic class B power amplifier with output waveforms.
- Explain the operation of UJT relaxation oscillator with circuit diagram & waveforms.
- For Common Source JFET amplifier with $R_d = 20 \text{ K}\Omega$ & $R_g = 100 \text{ M}\Omega$, $g_m = 2 \text{ mA/V}$, $r_d = 40 \text{ K}\Omega$. Calculate Voltage gain A_v , input resistance R_i & output resistance R_o .
- Draw construction diagram of N channel E-MOSFET and explain it's working.

Q.5 Attempt any Two: 12

- Design transistorized RC phase shift oscillator for output frequency of 10 KHz, at the Peak voltage of 5 volt. (Assume suitable data)
- Derive expressions for input resistance, output resistance, and voltage gain for CS JFET amplifier.
- Derive the equation for conversion efficiency for class A transformer coupled power amplifier.

Seat No.	
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Day & Date: Tuesday, 14-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Tick the correct option

14

- [illegible]

- 8) The region in which $V_{ds} > V_p$ & $V_{gs} > V_p$ for N channel JFET is called as ____
 - a) Ohmic region
 - b) Cutoff region
 - c) Pinch off region
 - d) None of these
- 9) For N channel E- MOSFET, V_{gs} should be ____ with positive V_{ds} so that MOSFET will conduct.
 - a) Positive
 - b) Negative
 - c) Either positive or negative
 - d) None of these
- 10) The Parameter independent of operating point ('Q' point) of transistor circuit is ____
 - a) I_c
 - b) I_B
 - c) β
 - d) I_E
- 11) Input and output resistance of transistor CB amplifier is ____ & ____ respectively.
 - a) Low & low
 - b) High & high
 - c) Low & high
 - d) High & low
- 12) The Early effect & Punch through effect are related with _____.
 - a) JEFT
 - b) BJT
 - c) Zener Diode
 - d) Transformer
- 13) If voltage gain of cascaded amplifier is 100 dB, for desired 20 volt output, find the value of input signal?
 - a) 1 mV
 - b) 2 mV
 - c) 0.1 mV
 - d) 0.2 mV
- 14) When two amplifiers are Cascaded that will result in _____.
 - a) Reduction in gain increase in BW
 - b) Increase in gain decrease in BW
 - c) Reduction in gain reduction in BW
 - d) None of these

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Electronic Circuit Analysis and Design (BTN06302)

Day & Date: Tuesday, 14-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Assume suitable data if required.
 4) Draw neat diagram whenever necessary.

Section – I

Q.2 Attempt any Four: 16

- Explain input & output characteristics of BJT in common emitter configuration.
- Derive H-parameter model & define H parameters for transistor in CE circuit configuration.
- Describe Q point stabilization in transistor voltage divider biasing circuit.
- Explain different types of coupling used in the multistage amplifiers.
- Describe the advantages of negative feedback in the feedback amplifiers.

Q.3 Attempt any Two: 12

- Derive expression for stability factor of transistor CE voltage divider biasing circuit & comment on Stability of operating point of the circuit.
- A transistor CE amplifier uses $R_L = 2.7 \text{ K}\Omega$. The H parameters are $h_{ie} = 4.5 \text{ K}\Omega$, $h_{re} = 2 \times 10^{-4}$, $h_{fe} = 330$, $h_{oe} = 30 \mu\text{S}$, $R_s = 0 \Omega$. Calculate A_i , A_v , R_i , R_o .
- Describe the different feedback amplifier topologies or types of feedback connections & their significance with neat block diagrams.

Section – II

Q.4 Attempt any Four: 16

- With the help of block diagram, explain working principle of oscillator & state Barkhausen's criteria.
- Draw & explain basic class B power amplifier with output waveforms.
- Explain the operation of UJT relaxation oscillator with circuit diagram & waveforms.
- For Common Source JFET amplifier with $R_d = 20 \text{ K}\Omega$ & $R_g = 100 \text{ M}\Omega$, $g_m = 2 \text{ mA/V}$, $r_d = 40 \text{ K}\Omega$. Calculate Voltage gain A_v , input resistance R_i & output resistance R_o .
- Draw construction diagram of N channel E-MOSFET and explain it's working.

Q.5 Attempt any Two: 12

- Design transistorized RC phase shift oscillator for output frequency of 10 KHz, at the Peak voltage of 5 volt. (Assume suitable data)
- Derive expressions for input resistance, output resistance, and voltage gain for CS JFET amplifier.
- Derive the equation for conversion efficiency for class A transformer coupled power amplifier.

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Network Theory and Analysis (BTN06303)

Max. Marks: 70

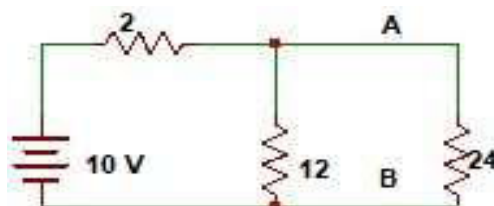
Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No 3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.

Marks: 14

14

- 1) Maximum power transfer occurs at efficiency of _____.
a) 100% b) 50%
c) 25% d) 75%
- 2) Thevenin's voltage $V_{Th} = 0$, if _____.
a) There is no dependent source in the circuit
b) There is voltage source of infinite magnitude
c) There is no independent source in the circuit
d) None of above
- 3) Consider the circuit shown below. Find the Thevenin's resistance between terminals A and B. All values are in ohms.



- a) $1\ \Omega$
c) $1.71\ \Omega$
- b) $2\ \Omega$
d) $2.7\ \Omega$
- 4) In parallel resonance, resonance occurs when susceptance part of admittance is _____.
a) Infinite
c) $X_c > X_L$
- b) $X_L > X_c$
d) Zero
- 5) A parallel RLC circuit has $R = 4\ \Omega$, $L = 4\text{ H}$ & $C = 0.25\ \mu\text{F}$, then at resonance, Quality factor Q is _____.
a) 1
c) 10
- b) 5
d) 20

- 6) When two port networks are connected in parallel the resultant _____.
 a) Z parameters are the sum of individual parameters
 b) Y parameters are the sum of individual parameters
 c) ABCD parameters are the sum of individual parameters
 d) h parameters are the sum of individual parameters
- 7) Which parameters are widely used in transmission line theory?
 a) Z parameters
 b) Y parameters
 c) ABCD parameters
 d) h parameters
- 8) Transient behavior occurs in any circuit when _____.
 a) There are sudden changes of applied voltage
 b) The voltage Source is shorted
 c) The circuit is connected to/ disconnected from voltage supply
 d) All of the above
- 9) The time constant of series RL circuit is _____.
 a) L/R
 b) R/L
 c) LR
 d) $e^{-R/L}$
- 10) $F(s) = 2S/(S^2 + 8)$, it will have finite Zero at _____.
 a) Infinity
 b) On imaginary axis
 c) In LHS of S-plane
 d) At origin of S-plane
- 11) When a series RC circuit is connected to a constant voltage. At $t = 0$, the current passing through the circuit at $t = 0+$ is _____.
 a) V/C
 b) V/R
 c) Infinite
 d) Zero
- 12) If network comprises purely resistive elements, what will it provide from following?
 a) Attenuation
 b) Phase shift
 c) Both a and b
 d) None of the above
- 13) In the m-derived low pass filter the resonant frequency is to be chosen so that it is _____.
 a) Same as cut-off frequencies
 b) Below the cut-off frequencies
 c) Above the cut-off frequencies
 d) None of above
- 14) The real part of the complex frequency is called _____.
 a) Radian frequency
 b) Angular frequency
 c) Sampling frequency
 d) Neper frequency

Seat No.	
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Network Theory and Analysis (BTN06303)

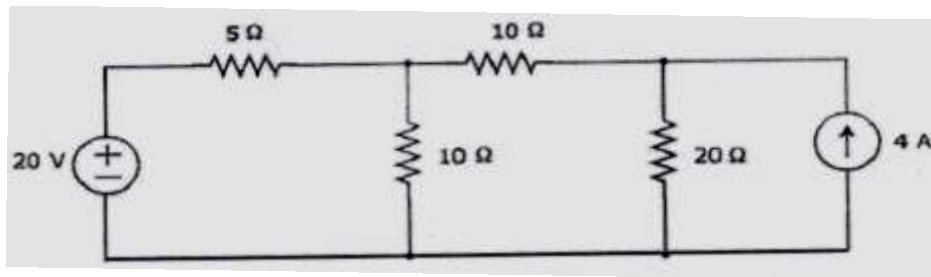
Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

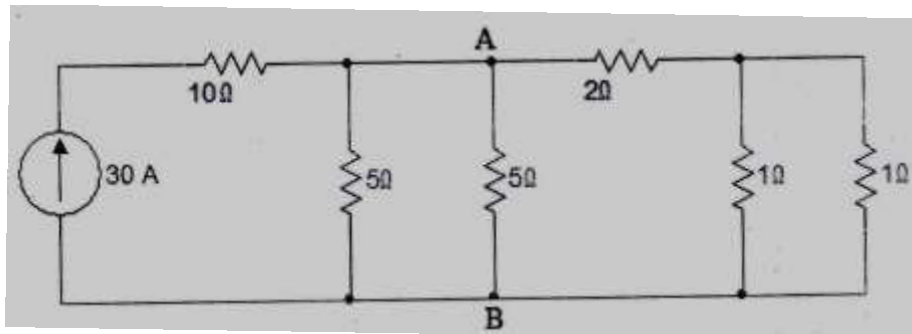
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I**Q.2 Answer any four of the following.****16**

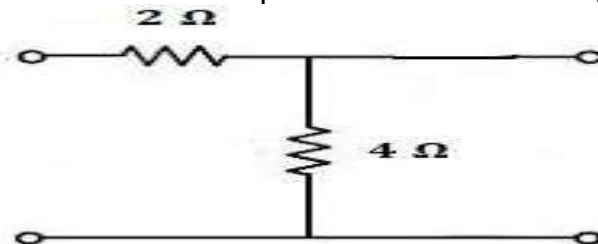
- a) Determine current flowing through $20\ \Omega$ resistor of the following circuit using superposition theorem.



- b) Determine the current flowing through $5\ \Omega$ (terminals A-B) resistor in the circuit shown below by using Norton's theorem.



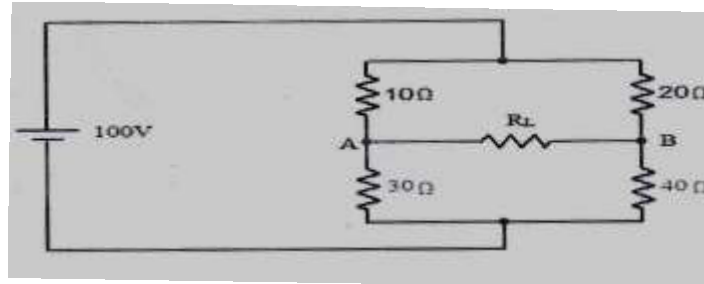
- c) Derive the expression for resonant frequency of a tank circuit.
 d) Calculate **h** parameters of the two-port network shown in figure.



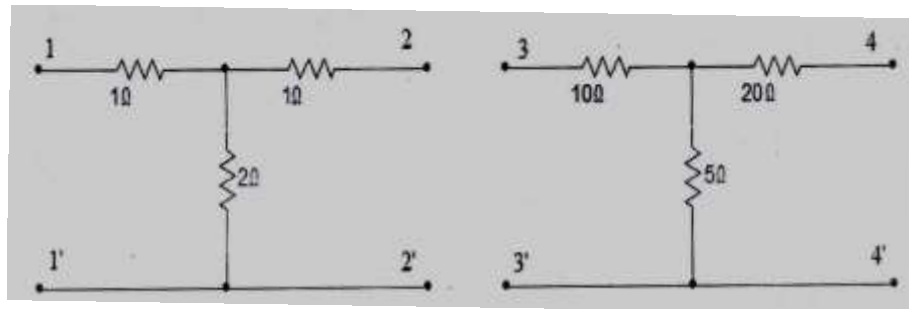
- e) Explain cascade connection of two port network.

Q.3 Answer any Two of the following.

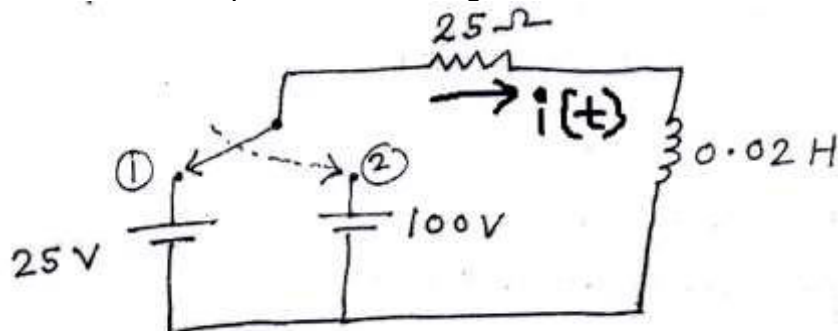
- a) $V(t) = 10 \sin \omega t$ is applied to a series RLC circuit. At resonant frequency, maximum voltage across capacitor is 500V. The bandwidth is 400 rad/second & impedance at resonance is 100Ω . Determine resonant frequency, quality factor. Also determine L and C
- b) Determine the load resistance R_L to receive maximum power from the source; Also find the maximum power delivered to the load in the circuit shown figure.



- c) The following two port networks connect in a series and determine an overall Z parameter of the series combination.

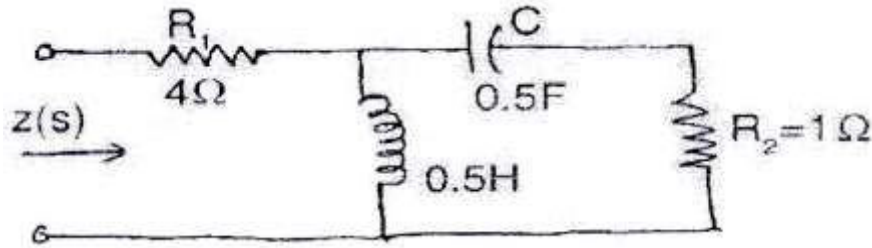
**Section – II****Q.4 Answer any four of the following.**

- a) Design T type attenuator having 20 dB attenuation with load impedance of 640Ω .
- b) Design constant k type high pass filter (T and π section) having cut off frequency of 2 kHz with load resistance of 500Ω .
- c) Determine current $i(t)$ for $t > 0$ when switch is moved from position 1 to position 2 at $t = 0$. The switch is at position 1 for long time.



- d) Explain step voltage response for RC series circuit.

- e) Calculate the driving point impedance $Z(s)$ and driving point admittance $Y(s)$ of the network shown below.



Q.5 Answer any Two of the following.

12

- a) Give the definition of pole and zero of the network. Draw pole zero diagram for given network function and hence obtain time domain response $i(t)$.

$$I(s) = 4s(s+2)/(s+1)(s+3)$$

- b) Design constant K Band pass filter (T and Π Section) having cut off frequency of 2 kHz and 5 kHz and a normal impedance of 600Ω
- c) The series RLC circuit consists of $R = 2\Omega$, $L = 1H$, $C = 1F$ with 100 V constant source.
When switch is closed at $t=0$, determine current $i(t)$ for $t>0$.

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Network Theory and Analysis (BTN06303)

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No 3 (starting page of the Answer Book). Each question carry one mark.
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

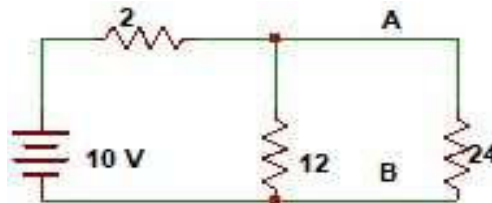
Marks: 14

Q.1 Choose the correct answer:

14

- 1) Transient behavior occurs in any circuit when _____.
 a) There are sudden changes of applied voltage
 b) The voltage Source is shorted
 c) The circuit is connected to/ disconnected from voltage supply
 d) All of the above
- 2) The time constant of series RL circuit is _____.
 a) L/R
 b) R/L
 c) LR
 d) $e^{-R/L}$
- 3) $F(s) = 2S/(S^2 + 8)$, it will have finite Zero at _____.
 a) Infinity
 b) On imaginary axis
 c) In LHS of S-plane
 d) At origin of S-plane
- 4) When a series RC circuit is connected to a constant voltage. At $t = 0$, the current passing through the circuit at $t = 0+$ is _____.
 a) V/C
 b) V/R
 c) Infinite
 d) Zero
- 5) If network comprises purely resistive elements, what will it provide from following?
 a) Attenuation
 b) Phase shift
 c) Both a and b
 d) None of the above
- 6) In the m-derived low pass filter the resonant frequency is to be chosen so that it is _____.
 a) Same as cut-off frequencies
 b) Below the cut-off frequencies
 c) Above the cut-off frequencies
 d) None of above
- 7) The real part of the complex frequency is called _____.
 a) Radian frequency
 b) Angular frequency
 c) Sampling frequency
 d) Neper frequency
- 8) Maximum power transfer occurs at efficiency of _____.
 a) 100%
 b) 50%
 c) 25%
 d) 75%

- 9) Thevenin's voltage $V_{Th} = 0$, if _____.
 a) There is no dependent source in the circuit
 b) There is voltage source of infinite magnitude
 c) There is no independent source in the circuit
 d) None of above
- 10) Consider the circuit shown below. Find the Thevenin's resistance between terminals A and B. All values are in ohms.



- a) 1Ω
 b) 2Ω
 c) 1.71Ω
 d) 2.7Ω
- 11) In parallel resonance, resonance occurs when susceptance part of admittance is _____.
 a) Infinite
 b) $X_L > X_C$
 c) $X_C > X_L$
 d) Zero
- 12) A parallel RLC circuit has $R = 4\Omega$, $L = 4H$ & $C = 0.25\mu F$, then at resonance, Quality factor Q is _____.
 a) 1
 b) 5
 c) 10
 d) 20
- 13) When two port networks are connected in parallel the resultant _____.
 a) Z parameters are the sum of individual parameters
 b) Y parameters are the sum of individual parameters
 c) ABCD parameters are the sum of individual parameters
 d) h parameters are the sum of individual parameters
- 14) Which parameters are widely used in transmission line theory?
 a) Z parameters
 b) Y parameters
 c) ABCD parameters
 d) h parameters

Seat No.	
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Network Theory and Analysis (BTN06303)

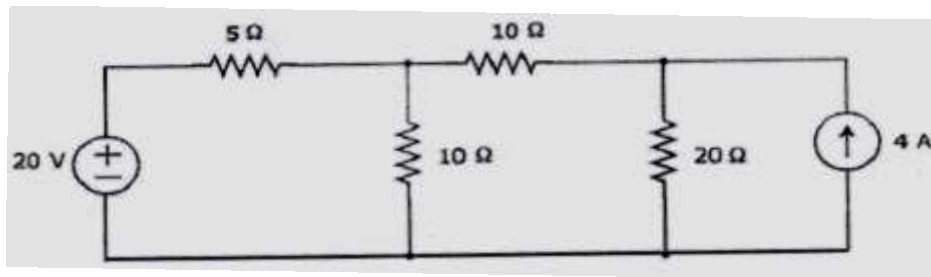
Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

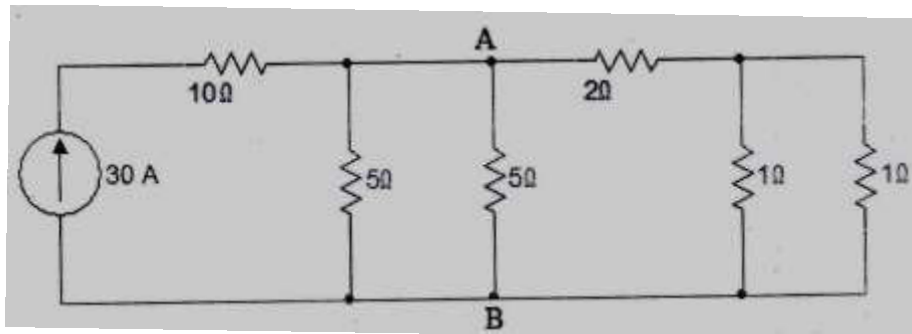
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I**Q.2 Answer any four of the following.****16**

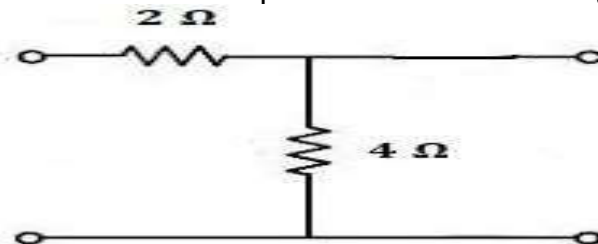
- a) Determine current flowing through $20\ \Omega$ resistor of the following circuit using superposition theorem.



- b) Determine the current flowing through $5\ \Omega$ (terminals A-B) resistor in the circuit shown below by using Norton's theorem.



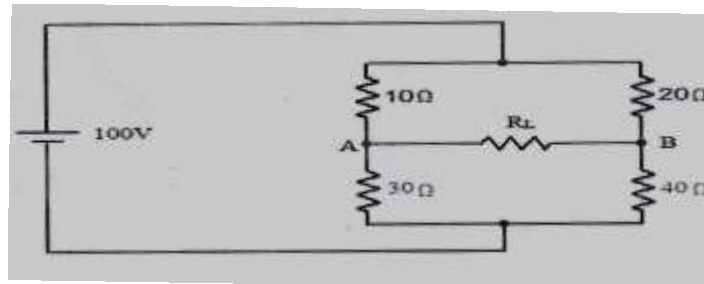
- c) Derive the expression for resonant frequency of a tank circuit.
 d) Calculate **h** parameters of the two-port network shown in figure.



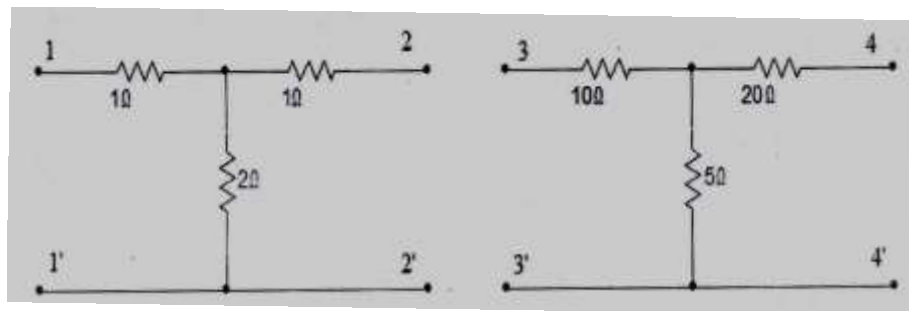
- e) Explain cascade connection of two port network.

Q.3 Answer any Two of the following.

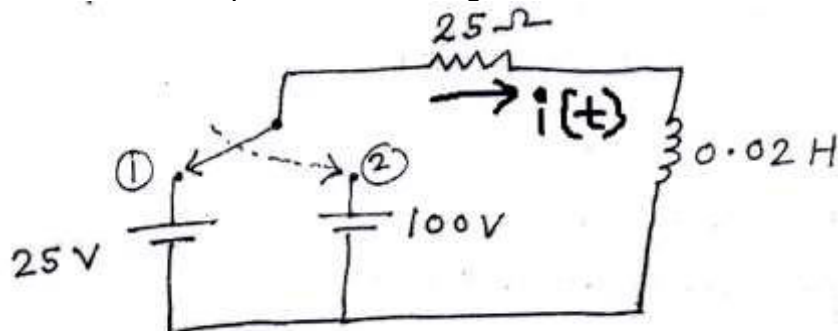
- a) $V(t) = 10 \sin \omega t$ is applied to a series RLC circuit. At resonant frequency, maximum voltage across capacitor is 500V. The bandwidth is 400 rad/second & impedance at resonance is 100Ω . Determine resonant frequency, quality factor. Also determine L and C
- b) Determine the load resistance R_L to receive maximum power from the source; Also find the maximum power delivered to the load in the circuit shown figure.



- c) The following two port networks connect in a series and determine an overall Z parameter of the series combination.

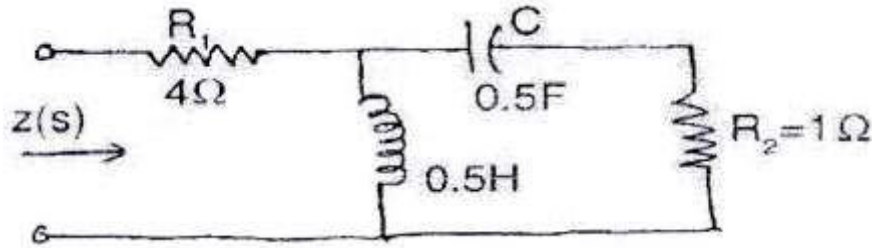
**Section – II****Q.4 Answer any four of the following.**

- a) Design T type attenuator having 20 dB attenuation with load impedance of 640Ω .
- b) Design constant k type high pass filter (T and π section) having cut off frequency of 2 kHz with load resistance of 500Ω .
- c) Determine current $i(t)$ for $t > 0$ when switch is moved from position 1 to position 2 at $t = 0$. The switch is at position 1 for long time.



- d) Explain step voltage response for RC series circuit.

- e) Calculate the driving point impedance $Z(s)$ and driving point admittance $Y(s)$ of the network shown below.



Q.5 Answer any Two of the following.

12

- a) Give the definition of pole and zero of the network. Draw pole zero diagram for given network function and hence obtain time domain response $i(t)$.

$$I(s) = 4s(s+2)/(s+1)(s+3)$$

- b) Design constant K Band pass filter (T and Π Section) having cut off frequency of 2 kHz and 5 kHz and a normal impedance of 600Ω
- c) The series RLC circuit consists of $R = 2\Omega$, $L = 1H$, $C = 1F$ with 100 V constant source.
When switch is closed at $t=0$, determine current $i(t)$ for $t>0$.

Seat No.	
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Day & Date: Wednesday, 15-05-2024
Time: 03:00 PM To 06:00 PM

Instructions:

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No 3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.

Marks: 14

14

- Page 11 of 20

Seat No.	
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Network Theory and Analysis (BTN06303)

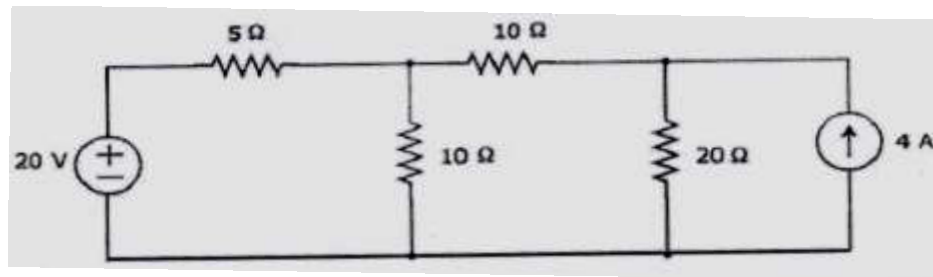
Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

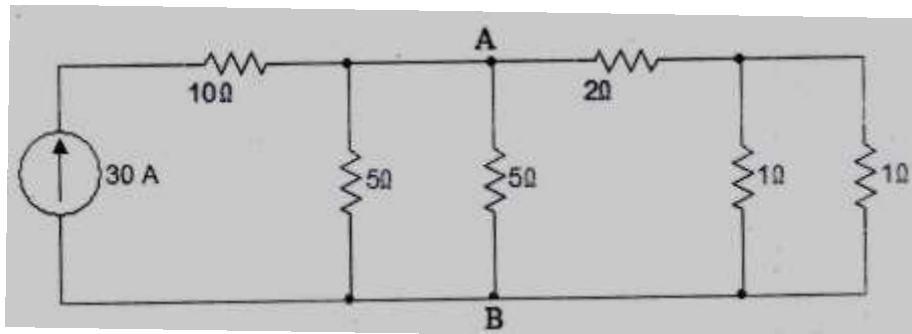
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I**Q.2 Answer any four of the following.****16**

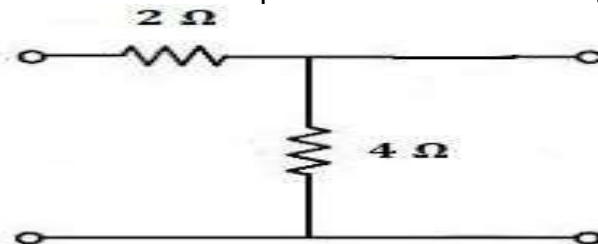
- a) Determine current flowing through $20\ \Omega$ resistor of the following circuit using superposition theorem.



- b) Determine the current flowing through $5\ \Omega$ (terminals A-B) resistor in the circuit shown below by using Norton's theorem.



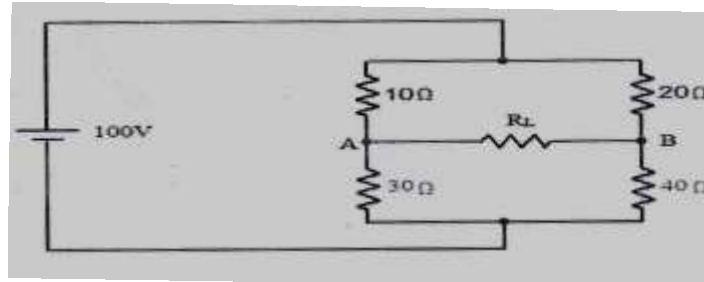
- c) Derive the expression for resonant frequency of a tank circuit.
 d) Calculate **h** parameters of the two-port network shown in figure.



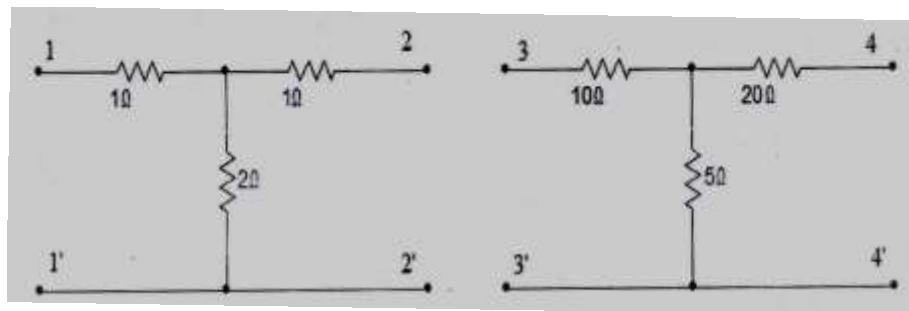
- e) Explain cascade connection of two port network.

Q.3 Answer any Two of the following.

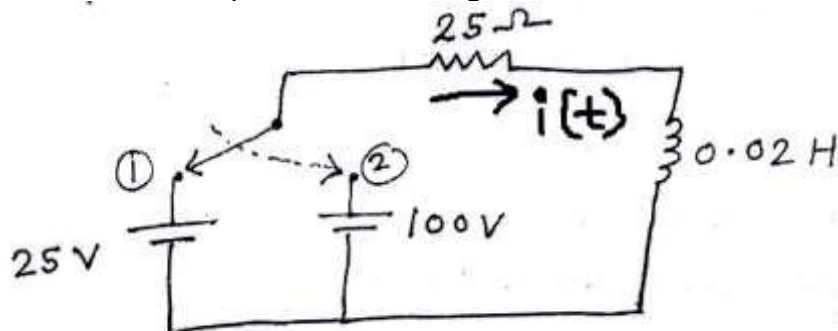
- a) $V(t) = 10 \sin \omega t$ is applied to a series RLC circuit. At resonant frequency, maximum voltage across capacitor is 500V. The bandwidth is 400 rad/second & impedance at resonance is 100Ω . Determine resonant frequency, quality factor. Also determine L and C
- b) Determine the load resistance R_L to receive maximum power from the source; Also find the maximum power delivered to the load in the circuit shown figure.



- c) The following two port networks connect in a series and determine an overall Z parameter of the series combination.

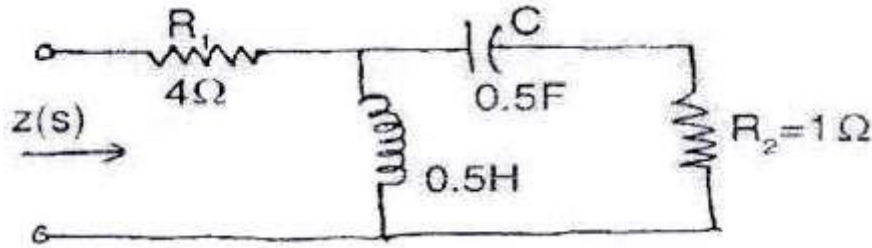
**Section – II****Q.4 Answer any four of the following.**

- a) Design T type attenuator having 20 dB attenuation with load impedance of 640Ω .
- b) Design constant k type high pass filter (T and π section) having cut off frequency of 2 kHz with load resistance of 500Ω .
- c) Determine current $i(t)$ for $t > 0$ when switch is moved from position 1 to position 2 at $t = 0$. The switch is at position 1 for long time.



- d) Explain step voltage response for RC series circuit.

- e) Calculate the driving point impedance $Z(s)$ and driving point admittance $Y(s)$ of the network shown below.



Q.5 Answer any Two of the following.

12

- a) Give the definition of pole and zero of the network. Draw pole zero diagram for given network function and hence obtain time domain response $i(t)$.

$$I(s) = 4s(s+2)/(s+1)(s+3)$$

- b) Design constant K Band pass filter (T and Π Section) having cut off frequency of 2 kHz and 5 kHz and a normal impedance of 600Ω
- c) The series RLC circuit consists of $R = 2\Omega$, $L = 1H$, $C = 1F$ with 100 V constant source.
When switch is closed at $t=0$, determine current $i(t)$ for $t>0$.

S

Max. Marks: 70

Marks: 14

14

- Page 16 of 20

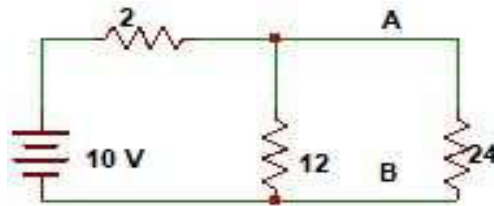
- 8) In the m-derived low pass filter the resonant frequency is to be chosen so that it is _____.
 a) Same as cut-off frequencies b) Below the cut-off frequencies
 c) Above the cut-off frequencies d) None of above

- 9) The real part of the complex frequency is called _____.
 a) Radian frequency b) Angular frequency
 c) Sampling frequency d) Neper frequency

- 10) Maximum power transfer occurs at efficiency of _____.
 a) 100% b) 50%
 c) 25% d) 75%

- 11) Thevenin's voltage $V_{Th} = 0$, if _____.
 a) There is no dependent source in the circuit
 b) There is voltage source of infinite magnitude
 c) There is no independent source in the circuit
 d) None of above

- 12) Consider the circuit shown below. Find the Thevenin's resistance between terminals A and B. All values are in ohms.



- a) 1Ω b) 2Ω
 c) 1.71Ω d) 2.7Ω
- 13) In parallel resonance, resonance occurs when susceptance part of admittance is _____.
 a) Infinite b) $X_L > X_C$
 c) $X_C > X_L$ d) Zero
- 14) A parallel RLC circuit has $R = 4\Omega$, $L = 4H$ & $C = 0.25\mu F$, then at resonance, Quality factor Q is _____.
 a) 1 b) 5
 c) 10 d) 20

Seat No.	
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S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Network Theory and Analysis (BTN06303)

Day & Date: Wednesday, 15-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

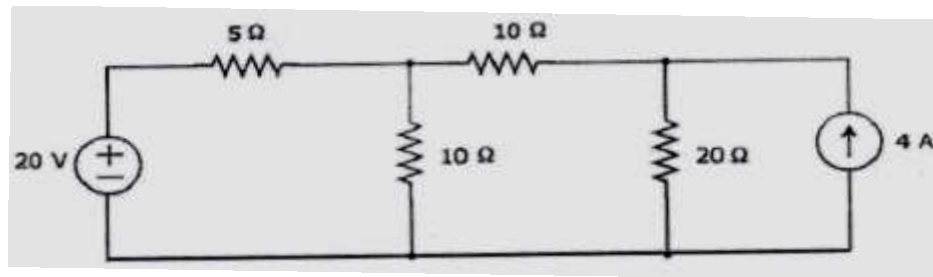
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

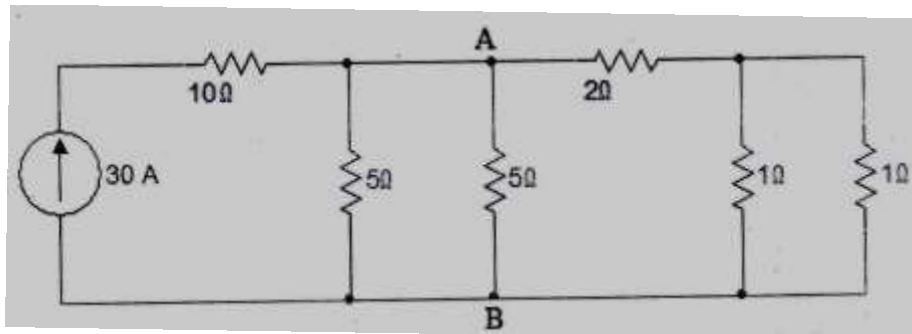
Q.2 Answer any four of the following.

16

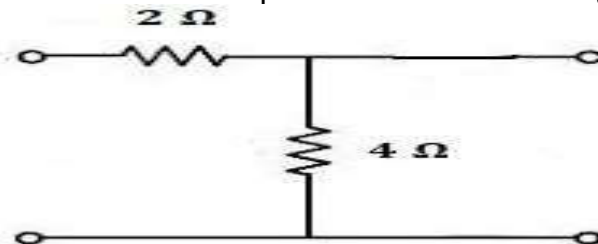
- a) Determine current flowing through $20\ \Omega$ resistor of the following circuit using superposition theorem.



- b) Determine the current flowing through $5\ \Omega$ (terminals A-B) resistor in the circuit shown below by using Norton's theorem.



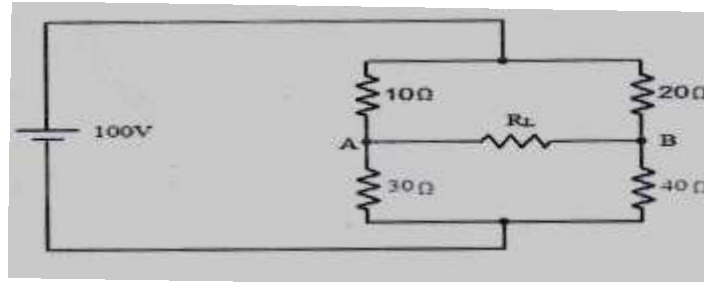
- c) Derive the expression for resonant frequency of a tank circuit.
 d) Calculate **h** parameters of the two-port network shown in figure.



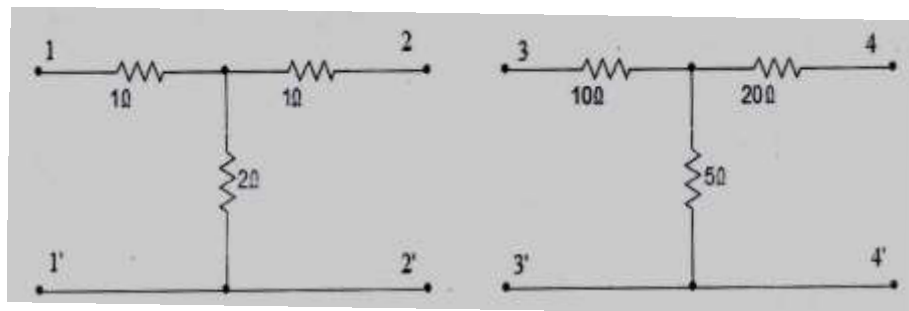
- e) Explain cascade connection of two port network.

Q.3 Answer any Two of the following.

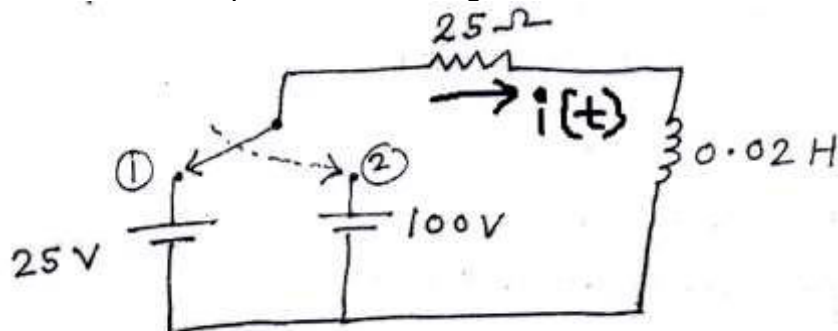
- a) $V(t) = 10 \sin \omega t$ is applied to a series RLC circuit. At resonant frequency, maximum voltage across capacitor is 500V. The bandwidth is 400 rad/second & impedance at resonance is 100Ω . Determine resonant frequency, quality factor. Also determine L and C
- b) Determine the load resistance R_L to receive maximum power from the source; Also find the maximum power delivered to the load in the circuit shown figure.



- c) The following two port networks connect in a series and determine an overall Z parameter of the series combination.

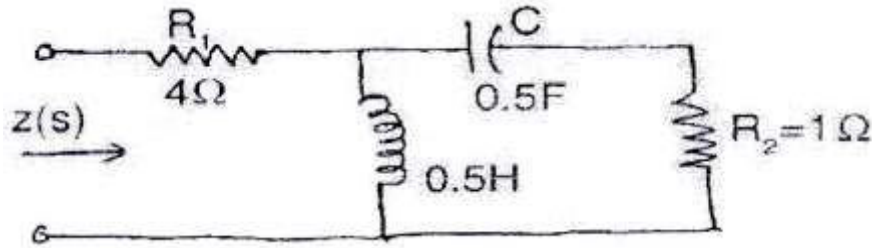
**Section – II****Q.4 Answer any four of the following.**

- a) Design T type attenuator having 20 dB attenuation with load impedance of 640Ω .
- b) Design constant k type high pass filter (T and π section) having cut off frequency of 2 kHz with load resistance of 500Ω .
- c) Determine current $i(t)$ for $t > 0$ when switch is moved from position 1 to position 2 at $t = 0$. The switch is at position 1 for long time.



- d) Explain step voltage response for RC series circuit.

- e) Calculate the driving point impedance $Z(s)$ and driving point admittance $Y(s)$ of the network shown below.



Q.5 Answer any Two of the following.

12

- a) Give the definition of pole and zero of the network. Draw pole zero diagram for given network function and hence obtain time domain response $i(t)$.

$$I(s) = 4s(s+2)/(s+1)(s+3)$$

- b) Design constant K Band pass filter (T and Π Section) having cut off frequency of 2 kHz and 5 kHz and a normal impedance of 600Ω
- c) The series RLC circuit consists of $R = 2\Omega$, $L = 1H$, $C = 1F$ with 100 V constant source.
When switch is closed at $t=0$, determine current $i(t)$ for $t>0$.

Seat No.	
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Set P

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct Answer**14**

- 1) Binary coded decimal is combination of _____.
 a) Two binary digit b) Three binary digit
 c) Four binary digit d) Five binary digit
- 2) The canonical sum of product form of function $Y(A, B) = A + B$ is _____.
 a) $AB + BA + A'A$ b) $AB + AB' + A'B$
 c) $AB + AB' + A'B'$ d) $A'B + AB' + A'B'$
- 3) There are _____ cells in 4 variable k-map.
 a) 4 b) 8
 c) 16 d) 32
- 4) Full subtractor is used to perform subtraction of _____.
 a) 2-bit b) 3-bit
 c) 4-bit d) 8-bit
- 5) In multiplexer the selection of particular input line is controlled by _____.
 a) Data controller b) Select lines
 c) Logic gate d) None of above
- 6) If two inputs are active on a priority encoder which will be coded output?
 a) The higher value b) The lower value
 c) Neither of input d) Both of input
- 7) When both inputs of SR flip flop are high, the flipflop goes to _____.
 a) unstable state b) stable state
 c) bistable state d) undefined state
- 8) In serial shifting method, data shifting occurs _____.
 a) One bit at a time b) Simultaneously
 c) Two bit at a time d) Four bit at a time

Seat No.	
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Set

P

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four: **16**

- a) What is hazard. Explain different types of hazards in digital system.
- b) Design Full adder using basic gates.
- c) Define following parameters of digital IC
 - i) Fan-In ii) Fan-out
 - iii) Noise Margin iv) Power dissipation
- d) What is Flip-Flop. Explain excitation table for all Flip-Flop?
- e) Write short note on BCD to 7 segment decoder using IC 7447.

Q.3 Attempt any Two: **12**

- a) Minimize the following function using k-map technique & realize using basic gates.

$$F(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5) + d(10, 11, 12, 13, 14, 15)$$
- b) What is Multiplexer Design 32:1 Mux using 4:1 Mux?
- c) Design 4-bit binary to grey code converter using logic gates.

Section – II

Q.4 Attempt any Four: **16**

- a) What is shift register. Explain SISO shift register in detail.
- b) Write short note on IC 7490.
- c) Explain Moore Machine in detail.
- d) Explain State diagram & State table with example.
- e) Draw and explain 4-bit ring counter with wave form.

Q.5 Attempt any two: **12**

- a) What is ripple counter? Explain how 4-bit asynchronous up counter is designed using T - Flip-Flop.
- b) Design Mod-5 counter using JK Flip-Flop.
- c) Explain 4-bit bidirectional shift register with diagram.

Seat No.	
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Set Q

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct Answer

14

- 1) In serial shifting method, data shifting occurs _____.
a) One bit at a time b) Simultaneously
c) Two bit at a time d) Four bit at a time
- 2) Which IC used for 4-bit shift register?
a) IC 7491 b) IC 7493
c) IC 7495 d) IC 7459
- 3) To operate correctly, starting a ring counter requires _____.
a) clearing all the flip flop
b) presetting all the flip flop
c) clearing one flip flop & presetting all other
d) presetting one flip flop & clearing all other
- 4) A decimal counter has _____ states.
a) 5 b) 10
c) 15 d) 20
- 5) How many natural states will be in 4-bit counter?
a) 4 b) 8
c) 16 d) 32
- 6) What is state diagram?
a) It provides graphical representation of states
b) It provides exactly the same information as state table
c) It is same as truth table
d) It is same as characteristic equation
- 7) A _____ machine is an FSM whose output depends on present state as well as the present input.
a) Melay b) Moore
c) Both a & b d) None of above
- 8) Binary coded decimal is combination of _____.
a) Two binary digit b) Three binary digit
c) Four binary digit d) Five binary digit

- 9) The canonical sum of product form of function $Y(A, B) = A + B$ is _____.
a) $AB + BA + A'A$ b) $AB + AB' + A'B$
c) $AB + AB' + A'B'$ d) $A'B + AB' + A'B'$
- 10) There are _____ cells in 4 variable k-map.
a) 4 b) 8
c) 16 d) 32
- 11) Full subtractor is used to perform subtraction of _____.
a) 2-bit b) 3-bit
c) 4-bit d) 8-bit
- 12) In multiplexer the selection of particular input line is controlled by _____.
a) Data controller b) Select lines
c) Logic gate d) None of above
- 13) If two inputs are active on a priority encoder which will be coded output?
a) The higher value b) The lower value
c) Neither of input d) Both of input
- 14) When both inputs of SR flip flop are high, the flipflop goes to _____.
a) unstable state b) stable state
c) bistable state d) undefined state

Seat No.	
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Set

Q

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four: **16**

- What is hazard. Explain different types of hazards in digital system.
- Design Full odder using basic gates.
- Define following parameters of digital IC
 - Fan-In
 - Fan-out
 - Noise Margin
 - Power dissipation
- What is Flip-Flop. Explain excitation table for all Flip-Flop?
- Write short note on BCD to 7 segment decoder using IC 7447.

Q.3 Attempt any Two: **12**

- Minimize the following function using k-map technique & realize using basic gates.

$$F(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5) + d(10, 11, 12, 13, 14, 15)$$
- What is Multiplexer Design 32:1 Mux using 4:1 Mux?
- Design 4-bit binary to grey code converter using logic gates.

Section – II

Q.4 Attempt any Four: **16**

- What is shift register. Explain SISO shift register in detail.
- Write short note on IC 7490.
- Explain Moore Machine in detail.
- Explain State diagram & State table with example.
- Draw and explain 4-bit ring counter with wave form.

Q.5 Attempt any two: **12**

- What is ripple counter? Explain how 4-bit asynchronous up counter is designed using T - Flip-Flop.
- Design Mod-5 counter using JK Flip-Flop.
- Explain 4-bit bidirectional shift register with diagram.

Seat No.	
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Set **R**

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct Answer**14**

- 1) A decimal counter has _____ states.
 - a) 5
 - b) 10
 - c) 15
 - d) 20
- 2) How many natural states will be in 4-bit counter?
 - a) 4
 - b) 8
 - c) 16
 - d) 32
- 3) What is state diagram?
 - a) It provides graphical representation of states
 - b) It provides exactly the same information as state table
 - c) It is same as truth table
 - d) It is same as characteristic equation
- 4) A _____ machine is an FSM whose output depends on present state as well as the present input.
 - a) Melay
 - b) Moore
 - c) Both a & b
 - d) None of above
- 5) Binary coded decimal is combination of _____.
 - a) Two binary digit
 - b) Three binary digit
 - c) Four binary digit
 - d) Five binary digit
- 6) The canonical sum of product form of function $Y(A, B) = A + B$ is _____.
 - a) $AB + BA + A'A$
 - b) $AB + AB' + A'B$
 - c) $AB + AB' + A'B'$
 - d) $A'B + AB' + A'B'$
- 7) There are _____ cells in 4 variable k-map.
 - a) 4
 - b) 8
 - c) 16
 - d) 32
- 8) Full subtractor is used to perform subtraction of _____.
 - a) 2-bit
 - b) 3-bit
 - c) 4-bit
 - d) 8-bit
- 9) In multiplexer the selection of particular input line is controlled by _____.
 - a) Data controller
 - b) Select lines
 - c) Logic gate
 - d) None of above

- 10)** If two inputs are active on a priority encoder which will be coded output?
- a) The higher value
 - b) The lower value
 - c) Neither of input
 - d) Both of input
- 11)** When both inputs of SR flip flop are high, the flipflop goes to ____.
- a) unstable state
 - b) stable state
 - c) bistable state
 - d) undefined state
- 12)** In serial shifting method, data shifting occurs ____.
- a) One bit at a time
 - b) Simultaneously
 - c) Two bit at a time
 - d) Four bit at a time
- 13)** Which IC used for 4-bit shift register?
- a) IC 7491
 - b) IC 7493
 - c) IC 7495
 - d) IC 7459
- 14)** To operate correctly, starting a ring counter requires ____.
- a) clearing all the flip flop
 - b) presetting all the flip flop
 - c) clearing one flip flop & presetting all other
 - d) presetting one flip flop & clearing all other

Seat No.	
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S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four: **16**

- What is hazard. Explain different types of hazards in digital system.
- Design Full odder using basic gates.
- Define following parameters of digital IC
 - Fan-In
 - Fan-out
 - Noise Margin
 - Power dissipation
- What is Flip-Flop. Explain excitation table for all Flip-Flop?
- Write short note on BCD to 7 segment decoder using IC 7447.

Q.3 Attempt any Two: **12**

- Minimize the following function using k-map technique & realize using basic gates.

$$F(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5) + d(10, 11, 12, 13, 14, 15)$$
- What is Multiplexer Design 32:1 Mux using 4:1 Mux?
- Design 4-bit binary to grey code converter using logic gates.

Section – II

Q.4 Attempt any Four: **16**

- What is shift register. Explain SISO shift register in detail.
- Write short note on IC 7490.
- Explain Moore Machine in detail.
- Explain State diagram & State table with example.
- Draw and explain 4-bit ring counter with wave form.

Q.5 Attempt any two: **12**

- What is ripple counter? Explain how 4-bit asynchronous up counter is designed using T - Flip-Flop.
- Design Mod-5 counter using JK Flip-Flop.
- Explain 4-bit bidirectional shift register with diagram.

Seat No.	
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Set S

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose correct Answer**14**

- 1) If two inputs are active on a priority encoder which will be coded output?
 - a) The higher value
 - b) The lower value
 - c) Neither of input
 - d) Both of input
- 2) When both inputs of SR flip flop are high, the flipflop goes to _____.
 - a) unstable state
 - b) stable state
 - c) bistable state
 - d) undefined state
- 3) In serial shifting method, data shifting occurs _____.
 - a) One bit at a time
 - b) Simultaneously
 - c) Two bit at a time
 - d) Four bit at a time
- 4) Which IC used for 4-bit shift register?
 - a) IC 7491
 - b) IC 7493
 - c) IC 7495
 - d) IC 7459
- 5) To operate correctly, starting a ring counter requires _____.
 - a) clearing all the flip flop
 - b) presetting all the flip flop
 - c) clearing one flip flop & presetting all other
 - d) presetting one flip flop & clearing all other
- 6) A decimal counter has _____ states.
 - a) 5
 - b) 10
 - c) 15
 - d) 20
- 7) How many natural states will be in 4-bit counter?
 - a) 4
 - b) 8
 - c) 16
 - d) 32
- 8) What is state diagram?
 - a) It provides graphical representation of states
 - b) It provides exactly the same information as state table
 - c) It is same as truth table
 - d) It is same as characteristic equation

- 9) A _____ machine is an FSM whose output depends on present state as well as the present input.
- a) Melay
 - b) Moore
 - c) Both a & b
 - d) None of above
- 10) Binary coded decimal is combination of _____.
- a) Two binary digit
 - b) Three binary digit
 - c) Four binary digit
 - d) Five binary digit
- 11) The canonical sum of product form of function $Y(A, B) = A + B$ is _____.
- a) $AB + BA + A'A$
 - b) $AB + AB' + A'B$
 - c) $AB + AB' + A'B'$
 - d) $A'B + AB' + A'B'$
- 12) There are _____ cells in 4 variable k-map.
- a) 4
 - b) 8
 - c) 16
 - d) 32
- 13) Full subtractor is used to perform subtraction of _____.
- a) 2-bit
 - b) 3-bit
 - c) 4-bit
 - d) 8-bit
- 14) In multiplexer the selection of particular input line is controlled by _____
- a) Data controller
 - b) Select lines
 - c) Logic gate
 - d) None of above

Seat No.	
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Set

S

S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS AND TELECOMMUNICATION ENGINEERING
Digital Techniques (BTN06304)

Day & Date: Thursday, 16-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any Four: **16**

- What is hazard. Explain different types of hazards in digital system.
- Design Full odder using basic gates.
- Define following parameters of digital IC
 - Fan-In
 - Fan-out
 - Noise Margin
 - Power dissipation
- What is Flip-Flop. Explain excitation table for all Flip-Flop?
- Write short note on BCD to 7 segment decoder using IC 7447.

Q.3 Attempt any Two: **12**

- Minimize the following function using k-map technique & realize using basic gates.

$$F(A, B, C, D) = \sum m(0, 1, 2, 3, 4, 5) + d(10, 11, 12, 13, 14, 15)$$
- What is Multiplexer Design 32:1 Mux using 4:1 Mux?
- Design 4-bit binary to grey code converter using logic gates.

Section – II

Q.4 Attempt any Four: **16**

- What is shift register. Explain SISO shift register in detail.
- Write short note on IC 7490.
- Explain Moore Machine in detail.
- Explain State diagram & State table with example.
- Draw and explain 4-bit ring counter with wave form.

Q.5 Attempt any two: **12**

- What is ripple counter? Explain how 4-bit asynchronous up counter is designed using T - Flip-Flop.
- Design Mod-5 counter using JK Flip-Flop.
- Explain 4-bit bidirectional shift register with diagram.

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Max. Marks: 70

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks:14

14

- 1) Over modulation occurs when _____.
a) $V_m > V_c$
b) $V_m < V_c$
c) $V_m = V_c$
d) Timer Register
- 2) Noise always affects the signal in a communications stem at the _____.
a) Transmitter
b) Channel
c) Information source
d) Destination
- 3) What is the maximum transmission efficiency?
a) 67.88%
b) 33.33%
c) 73%
d) 54.03%
- 4) The ability of the receiver to select the wanted signals among the various incoming signals is termed as _____.
a) Sensitivity
b) Selectivity
c) Stability
d) None of the above
- 5) Frequency components of an AM wave (m = modulation index) are _____.
a) Carrier frequency (ωc) with amplitude A
b) Upper side band ($\omega c + \omega m$) having amplitude $mA/2$
c) Lower side band ($\omega c - \omega m$) having amplitude $mA/2$
d) All of the above
- 6) The sampling technique having the minimum noise interference is _____.
a) Instantaneous sampling
b) Natural sampling
c) Flat top sampling
d) All of the above
- 7) In amplitude modulation, bandwidth is _____ the audio signal frequency.
a) Thrice
b) Four times
c) Twice
d) None of the above
- 8) Noise figure is defined as _____.
a) S_o/N_o
b) S_i/N_i
c) $(S_o/N_o / S_i/N_i)$
d) $(S_i/N_i / S_o/N_o)$

Seat No.	
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Set P

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following. **16**

- Explain modulation and modulation index. Why modulation is necessary?
- Explain how noise can be calculated in different cascading amplifying stage.
- Derive the expression for AM Power.
- Calculate the noise voltage at the input of TV amplifier using device that has 200ohm equivalent noise resistance, 300 ohm i/p resistance. The bandwidth of amplifier is 6MHz & temperature is 17degree.
- Explain ring modulator & its spectrum.

Q.3 Attempt any two of the following. **12**

- Define noise. Explain different types of noise present inside and outside the receiver.
- Derive the expression for mathematical analysis of AM modulation, and bandwidth.
- Explain the different types of AM Transmitter.

Section – II

Q.4 Attempt any four of the following. **16**

- Explain Armstrong method to convert phase modulation to frequency modulation.
- Prove sampling theorem, explain Nyquist's rate & interval.
- Explain need for Pre-emphasis & De-emphasis in frequency modulation.
- Explain envelope detector for DSB-SC Demodulation.
- Compare PAM, PPM, PWM.

Q.5 Attempt any two of the following. **12**

- Explain principle of FM wave generation using direct method. State merits & demerits of this method.
- Write an expression for FM modulated wave. What is narrowband & wideband FM?
- A frequency modulated signal is represented by voltage equation as:

$$E_{FM} = 10 \sin(6 \times 10^8 t + 5 \sin 1250 t)$$
 Calculate carrier frequency, modulating frequency, modulation index, maximum deviation and Power of FM wave when R = 20 ohm.

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Max. Marks: 70

MCQ/Objective Type Questions

Marks:14

14

- Page 4 of 12

**Seat
No.****Set Q**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following. 16

- a) Explain modulation and modulation index. Why modulation is necessary?
- b) Explain how noise can be calculated in different cascading amplifying stage.
- c) Derive the expression for AM Power.
- d) Calculate the noise voltage at the input of TV amplifier using device that has 200ohm equivalent noise resistance, 300 ohm i/p resistance. The bandwidth of amplifier is 6MHz & temperature is 17degree.
- e) Explain ring modulator & its spectrum.

Q.3 Attempt any two of the following. 12

- a) Define noise. Explain different types of noise present inside and outside the receiver.
- b) Derive the expression for mathematical analysis of AM modulation, and bandwidth.
- c) Explain the different types of AM Transmitter.

Section – II

Q.4 Attempt any four of the following. 16

- a) Explain Armstrong method to convert phase modulation to frequency modulation.
- b) Prove sampling theorem, explain Nyquist's rate & interval.
- c) Explain need for Pre-emphasis & De-emphasis in frequency modulation.
- d) Explain envelope detector for DSB-SC Demodulation.
- e) Compare PAM, PPM, PWM.

Q.5 Attempt any two of the following. 12

- a) Explain principle of FM wave generation using direct method. State merits & demerits of this method.
- b) Write an expression for FM modulated wave. What is narrowband & wideband FM?
- c) A frequency modulated signal is represented by voltage equation as:
$$E_{FM} = 10 \sin(6 \times 10^8 t + 5 \sin 1250 t)$$

Calculate carrier frequency, modulating frequency, modulation index, maximum deviation and Power of FM wave when $R = 20 \text{ ohm}$.

Seat No.	
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Set	R
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S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) Function of frequency mixer in super heterodyne receiver is _____.
 a) Amplification
 b) Filtering
 c) Multiplication of incoming signal and the locally generated carrier
 d) None of the above
- 2) Examples of low level modulation are _____.
 a) Square law diode modulation
 b) Switching modulation
 c) Frequency discrimination method
 d) Both a and b
- 3) In pulse width modulation, _____.
 a) Synchronization is not required between transmitter and receiver
 b) Amplitude of the carrier pulse is varied
 c) Instantaneous power at the transmitter is constant
 d) None of the above
- 4) Calculate the Nyquist rate for sampling when a continuous time signal is given by $x(t) = 5 \cos 100\pi t + 10 \cos 200\pi t - 15 \cos 300\pi t$
 a) 300Hz
 b) 600Hz
 c) 150Hz
 d) 200Hz
- 5) Over modulation occurs when _____.
 a) $V_m > V_c$
 b) $V_m < V_c$
 c) $V_m = V_c$
 d) Timer Register
- 6) Noise always affects the signal in a communications stem at the _____.
 a) Transmitter
 b) Channel
 c) Information source
 d) Destination
- 7) What is the maximum transmission efficiency?
 a) 67.88%
 b) 33.33%
 c) 73%
 d) 54.03%

Seat
No.Set **R**

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Day & Date: Friday, 17-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following. **16**

- a) Explain modulation and modulation index. Why modulation is necessary?
- b) Explain how noise can be calculated in different cascading amplifying stage.
- c) Derive the expression for AM Power.
- d) Calculate the noise voltage at the input of TV amplifier using device that has 200ohm equivalent noise resistance, 300 ohm i/p resistance. The bandwidth of amplifier is 6MHz & temperature is 17degree.
- e) Explain ring modulator & its spectrum.

Q.3 Attempt any two of the following. **12**

- a) Define noise. Explain different types of noise present inside and outside the receiver.
- b) Derive the expression for mathematical analysis of AM modulation, and bandwidth.
- c) Explain the different types of AM Transmitter.

Section – II

Q.4 Attempt any four of the following. **16**

- a) Explain Armstrong method to convert phase modulation to frequency modulation.
- b) Prove sampling theorem, explain Nyquist's rate & interval.
- c) Explain need for Pre-emphasis & De-emphasis in frequency modulation.
- d) Explain envelope detector for DSB-SC Demodulation.
- e) Compare PAM, PPM, PWM.

Q.5 Attempt any two of the following. **12**

- a) Explain principle of FM wave generation using direct method. State merits & demerits of this method.
- b) Write an expression for FM modulated wave. What is narrowband & wideband FM?
- c) A frequency modulated signal is represented by voltage equation as:

$$E_{FM} = 10 \sin(6 \times 10^8 t + 5 \sin 1250 t)$$
 Calculate carrier frequency, modulating frequency, modulation index, maximum deviation and Power of FM wave when $R = 20 \text{ ohm}$.

Seat No.	
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Set S

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

Q.1 Choose the correct alternatives from the given options. 14

- 1) The sampling technique having the minimum noise interference is _____.
a) Instantaneous sampling b) Natural sampling
c) Flat top sampling d) All of the above
- 2) In amplitude modulation, bandwidth is _____ the audio signal frequency.
a) Thrice b) Four times
c) Twice d) None of the above
- 3) Noise figure is defined as _____.
a) S_o/N_o b) S_i/N_i
c) $(S_o/N_o / S_i/N_i)$ d) $(S_i/N_i / S_o/N_o)$
- 4) The total power in an Amplitude Modulated signal if the carrier of an AM transmitter is 800 W and it is modulated 50 percent.
a) 850 W b) 1000.8 KW
c) 750 W d) 900 W
- 5) Standard intermediate frequency used for AM receiver is _____.
a) 455 MHz b) 455 KHz
c) 455 Hz d) None of the above
- 6) Function of frequency mixer in super heterodyne receiver is _____.
a) Amplification
b) Filtering
c) Multiplication of incoming signal and the locally generated carrier
d) None of the above
- 7) Examples of low level modulation are _____.
a) Square law diode modulation
b) Switching modulation
c) Frequency discrimination method
d) Both a and b
- 8) In pulse width modulation, _____.
a) Synchronization is not required between transmitter and receiver
b) Amplitude of the carrier pulse is varied
c) Instantaneous power at the transmitter is constant
d) None of the above

- 9) Calculate the Nyquist rate for sampling a continuous time signal is given by $x(t) = 5 \cos 100\pi t + 10 \cos 200\pi t - 15 \cos 300\pi t$
 - a) 300Hz
 - b) 600Hz
 - c) 150Hz
 - d) 200Hz
- 10) Over modulation occurs when _____.
 - a) $V_m > V_c$
 - b) $V_m < V_c$
 - c) $V_m = V_c$
 - d) Timer Register
- 11) Noise always affects the signal in a communications stem at the _____.
 - a) Transmitter
 - b) Channel
 - c) Information source
 - d) Destination
- 12) What is the maximum transmission efficiency?
 - a) 67.88%
 - b) 33.33%
 - c) 73%
 - d) 54.03%
- 13) The ability of the receiver to select the wanted signals among the various incoming signals is termed as _____.
 - a) Sensitivity
 - b) Selectivity
 - c) Stability
 - d) None of the above
- 14) Frequency components of an AM wave (m = modulation index) are _____.
 - a) Carrier frequency (ω_c) with amplitude A
 - b) Upper side band ($\omega_c + \omega_m$) having amplitude $mA/2$
 - c) Lower side band ($\omega_c - \omega_m$) having amplitude $mA/2$
 - d) All of the above

Seat No.	
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Set S

S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Communication (BTN06305)

Day & Date: Friday, 17-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Section – I

Q.2 Attempt any four of the following. 16

- a) Explain modulation and modulation index. Why modulation is necessary?
- b) Explain how noise can be calculated in different cascading amplifying stage.
- c) Derive the expression for AM Power.
- d) Calculate the noise voltage at the input of TV amplifier using device that has 200ohm equivalent noise resistance, 300 ohm i/p resistance. The bandwidth of amplifier is 6MHz & temperature is 17degree.
- e) Explain ring modulator & its spectrum.

Q.3 Attempt any two of the following. 12

- a) Define noise. Explain different types of noise present inside and outside the receiver.
- b) Derive the expression for mathematical analysis of AM modulation, and bandwidth.
- c) Explain the different types of AM Transmitter.

Section – II

Q.4 Attempt any four of the following. 16

- a) Explain Armstrong method to convert phase modulation to frequency modulation.
- b) Prove sampling theorem, explain Nyquist's rate & interval.
- c) Explain need for Pre-emphasis & De-emphasis in frequency modulation.
- d) Explain envelope detector for DSB-SC Demodulation.
- e) Compare PAM, PPM, PWM.

Q.5 Attempt any two of the following. 12

- a) Explain principle of FM wave generation using direct method. State merits & demerits of this method.
- b) Write an expression for FM modulated wave. What is narrowband & wideband FM?
- c) A frequency modulated signal is represented by voltage equation as:
$$E_{FM} = 10 \sin(6 \times 10^8 t + 5 \sin 1250 t)$$

Calculate carrier frequency, modulating frequency, modulation index, maximum deviation and Power of FM wave when $R = 20 \text{ ohm}$.

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Multiple choice questions.

14

- 1) Which notation represents the feedback path in closed loop system representation?

a) $b(t)$	b) $c(t)$
c) $e(t)$	d) $r(t)$
- 2) The output signal is fed back at the input side from the _____ point.

a) Summing	b) Differential
c) Take-off	d) All of the above
- 3) While shifting a take-off point after the summing point, which among the following should be added?

a) Summing point in series with take-off point
b) Summing point in parallel with take-off point
c) Block of reciprocal transfer function
d) Block of inverse transfer function
- 4) In a signal flow graph, nodes are represented by small _____.

a) Circles	b) Squares
c) Arrows	d) Pointers
- 5) If finite numbers of blocks are connected in series or cascade configuration, then how are the blocks combined algebraically?

a) By addition	b) By multiplication
c) By differentiation	d) By integration
- 6) In time domain system, which response has its existence even after an extinction of transient response?

a) Step response	b) Impulse response
c) Steady state response	d) All of the above
- 7) On which factor does the steady state error of the system depend?

a) Order	b) Type
c) Size	d) Prototype

Seat No.	
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Set	P
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four:

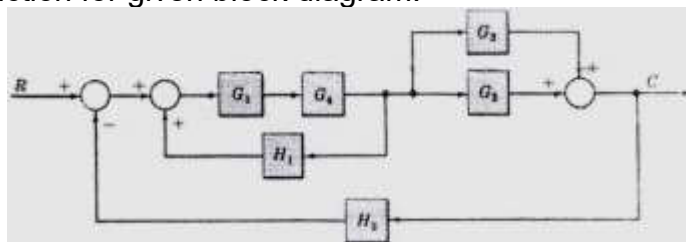
16

- Derive transfer function for closed loop control system.
- Explain missile launching and guidance system.
- Explain the rules for block diagram reduction technique.
- Explain Mason's gain formula.
- What is a "TYPES" of system? Explain type 0 and type 1 system.

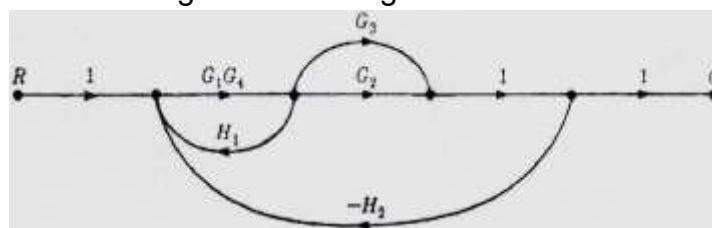
Q.3 Attempt any two:

12

- Explain time response specifications in detail.
- Find transfer function for given block diagram.



- Find transfer function for given SFG diagram.



Section – II

Q.4 Solve Any Four:

16

- Explain two special cases in Routh - Hurwitz criterion.
- Write a short note on Centroid, Root Loci, Angle of asymptotes, Angle of arrival and departure.
- What is bode plot? Explain the steps to sketch bode plot.
- What is Lag compensator? Obtain the transfer function and draw a pole-zero plot.
- Write a note on state transition matrix.

Q.5 Attempt any two:

- a) Determine the stability of the system using RH criterion
 $G(s) = 6(s + 1) / (s^4 + 2s^3 + 9s + 6)$ and $H(s) = 1$
- b) Sketch the bode plot for following transfer function and obtain gain and phase cross over frequency.
 $G(s)H(s) = 10/s(s + 1)(s + 10)$
- c) Sketch root locus for the system $G(s) = K(s + 4)/s^2 + 6s + 13$, $H(s) = 1$

Seat No.	
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Set **Q**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Multiple choice questions.

14

- 1) In Routh array, if zero is found in the first column, then by which term it needs to be replaced?

a) δ	b) η
c) σ	d) ε
- 2) For drawing root locus, the angle of asymptote yields the direction along which _____ branches approach to infinity.

a) $p + z$	b) $p - z$
c) p / z	d) $p * z$
- 3) What should be the nature of root locus about the real axis?

a) Asymmetric	b) Symmetric
c) Exponential	d) Decaying
- 4) Which unit is adopted for magnitude measurement in Bode plots?

a) Degree	b) Decimal
c) Decibel	d) Deviation
- 5) If a pole is located at origin, how does it get represented on the magnitude plot?

a) $-10 \log(\omega)$ dB	b) $-20 \log(\omega)$ dB
c) $-40 \log(\omega)$ dB	d) $-60 \log(\omega)$ dB
- 6) How is the sinusoidal transfer function obtained from the system transfer function in frequency domain?

a) Replacement of ' $j\omega$ ' by ' s '	b) Replacement of ' s ' by ' ω '
c) Replacement of ' s ' by ' $j\omega$ '	d) Replacement of ' ω ' by ' s '
- 7) In bode plot phase margin is calculated at _____.

a) Phase cross-over frequency	b) Corner frequency
c) Any frequency	d) Gain cross-over frequency
- 8) Which notation represents the feedback path in closed loop system representation?

a) $b(t)$	b) $c(t)$
c) $e(t)$	d) $r(t)$

- 9) The output signal is fed back at the input side from the _____ point.
 - a) Summing
 - b) Differential
 - c) Take-off
 - d) All of the above
- 10) While shifting a take-off point after the summing point, which among the following should be added?
 - a) Summing point in series with take-off point
 - b) Summing point in parallel with take-off point
 - c) Block of reciprocal transfer function
 - d) Block of inverse transfer function
- 11) In a signal flow graph, nodes are represented by small _____.
 - a) Circles
 - b) Squares
 - c) Arrows
 - d) Pointers
- 12) If finite numbers of blocks are connected in series or cascade configuration, then how are the blocks combined algebraically?
 - a) By addition
 - b) By multiplication
 - c) By differentiation
 - d) By integration
- 13) In time domain system, which response has its existence even after an extinction of transient response?
 - a) Step response
 - b) Impulse response
 - c) Steady state response
 - d) All of the above
- 14) On which factor does the steady state error of the system depend?
 - a) Order
 - b) Type
 - c) Size
 - d) Prototype

Seat No.	
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Set **Q**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

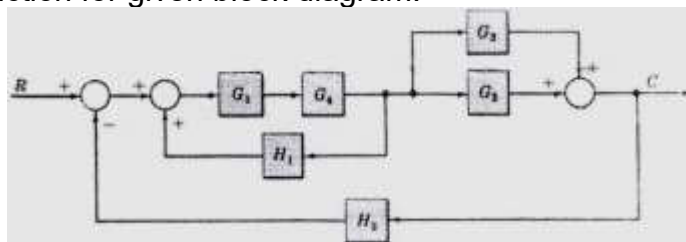
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I**Q.2 Attempt any four:****16**

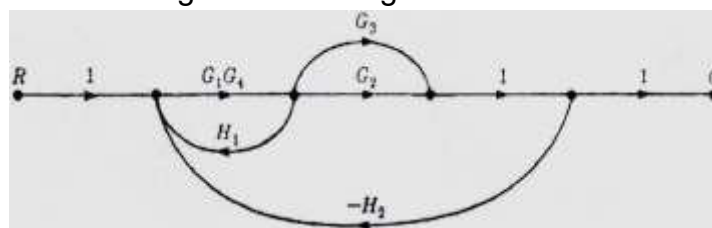
- Derive transfer function for closed loop control system.
- Explain missile launching and guidance system.
- Explain the rules for block diagram reduction technique.
- Explain Mason's gain formula.
- What is a "TYPES" of system? Explain type 0 and type 1 system.

Q.3 Attempt any two:**12**

- Explain time response specifications in detail.
- Find transfer function for given block diagram.



- Find transfer function for given SFG diagram.

**Section – II****Q.4 Solve Any Four:****16**

- Explain two special cases in Routh - Hurwitz criterion.
- Write a short note on Centroid, Root Loci, Angle of asymptotes, Angle of arrival and departure.
- What is bode plot? Explain the steps to sketch bode plot.
- What is Lag compensator? Obtain the transfer function and draw a pole-zero plot.
- Write a note on state transition matrix.

Q.5 Attempt any two:

- a) Determine the stability of the system using RH criterion
 $G(s) = 6(s + 1) / (s^4 + 2s^3 + 9s + 6)$ and $H(s) = 1$
- b) Sketch the bode plot for following transfer function and obtain gain and phase cross over frequency.
 $G(s)H(s) = 10/s(s + 1)(s + 10)$
- c) Sketch root locus for the system $G(s) = K(s + 4)/s^2 + 6s + 13$, $H(s) = 1$

Seat No.	
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Set **R**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Multiple choice questions.

14

- 1) Which unit is adopted for magnitude measurement in Bode plots?
 - a) Degree
 - b) Decimal
 - c) Decibel
 - d) Deviation
- 2) If a pole is located at origin, how does it get represented on the magnitude plot?
 - a) $-10 \log(\omega)$ dB
 - b) $-20 \log(\omega)$ dB
 - c) $-40 \log(\omega)$ dB
 - d) $-60 \log(\omega)$ dB
- 3) How is the sinusoidal transfer function obtained from the system transfer function in frequency domain?
 - a) Replacement of ' $j\omega$ ' by ' s '
 - b) Replacement of ' s ' by ' ω '
 - c) Replacement of ' s ' by ' $j\omega$ '
 - d) Replacement of ' ω ' by ' s '
- 4) In bode plot phase margin is calculated at _____.
 - a) Phase cross-over frequency
 - b) Corner frequency
 - c) Any frequency
 - d) Gain cross-over frequency
- 5) Which notation represents the feedback path in closed loop system representation?
 - a) $b(t)$
 - b) $c(t)$
 - c) $e(t)$
 - d) $r(t)$
- 6) The output signal is fed back at the input side from the _____ point.
 - a) Summing
 - b) Differential
 - c) Take-off
 - d) All of the above
- 7) While shifting a take-off point after the summing point, which among the following should be added?
 - a) Summing point in series with take-off point
 - b) Summing point in parallel with take-off point
 - c) Block of reciprocal transfer function
 - d) Block of inverse transfer function
- 8) In a signal flow graph, nodes are represented by small _____.
 - a) Circles
 - b) Squares
 - c) Arrows
 - d) Pointers

- 9) If finite numbers of blocks are connected in series or cascade configuration, then how are the blocks combined algebraically?
 - a) By addition
 - b) By multiplication
 - c) By differentiation
 - d) By integration
- 10) In time domain system, which response has its existence even after an extinction of transient response?
 - a) Step response
 - b) Impulse response
 - c) Steady state response
 - d) All of the above
- 11) On which factor does the steady state error of the system depend?
 - a) Order
 - b) Type
 - c) Size
 - d) Prototype
- 12) In Routh array, if zero is found in the first column, then by which term it needs to be replaced?
 - a) δ
 - b) η
 - c) σ
 - d) ε
- 13) For drawing root locus, the angle of asymptote yields the direction along which _____ branches approach to infinity.
 - a) $p + z$
 - b) $p - z$
 - c) p / z
 - d) $p * z$
- 14) What should be the nature of root locus about the real axis?
 - a) Asymmetric
 - b) Symmetric
 - c) Exponential
 - d) Decaying

Seat No.	
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Set **R**

S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

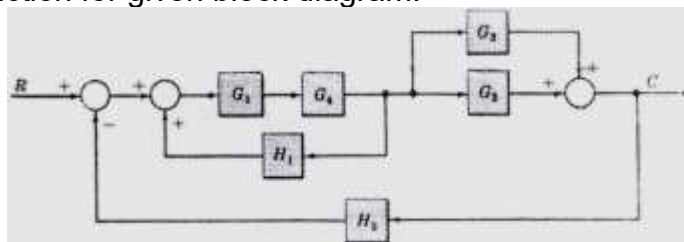
Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I**Q.2 Attempt any four:****16**

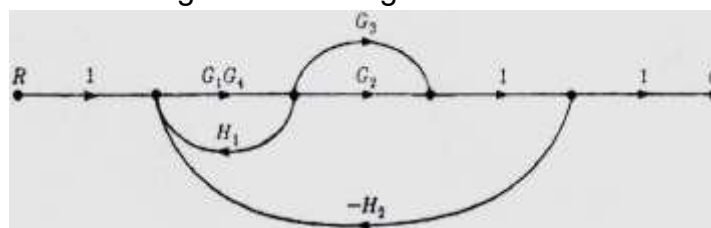
- Derive transfer function for closed loop control system.
- Explain missile launching and guidance system.
- Explain the rules for block diagram reduction technique.
- Explain Mason's gain formula.
- What is a "TYPES" of system? Explain type 0 and type 1 system.

Q.3 Attempt any two:**12**

- Explain time response specifications in detail.
- Find transfer function for given block diagram.



- Find transfer function for given SFG diagram.

**Section – II****Q.4 Solve Any Four:****16**

- Explain two special cases in Routh - Hurwitz criterion.
- Write a short note on Centroid, Root Loci, Angle of asymptotes, Angle of arrival and departure.
- What is bode plot? Explain the steps to sketch bode plot.
- What is Lag compensator? Obtain the transfer function and draw a pole-zero plot.
- Write a note on state transition matrix.

Q.5 Attempt any two:

- a) Determine the stability of the system using RH criterion
 $G(s) = 6(s + 1) / (s^4 + 2s^3 + 9s + 6)$ and $H(s) = 1$
- b) Sketch the bode plot for following transfer function and obtain gain and phase cross over frequency.
 $G(s)H(s) = 10/s(s + 1)(s + 10)$
- c) Sketch root locus for the system $G(s) = K(s + 4)/s^2 + 6s + 13$, $H(s) = 1$

Seat No.	
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Set	S
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Multiple choice questions.

14

- 1) In time domain system, which response has its existence even after an extinction of transient response?
 - a) Step response
 - b) Impulse response
 - c) Steady state response
 - d) All of the above
- 2) On which factor does the steady state error of the system depend?
 - a) Order
 - b) Type
 - c) Size
 - d) Prototype
- 3) In Routh array, if zero is found in the first column, then by which term it needs to be replaced?
 - a) δ
 - b) η
 - c) σ
 - d) ε
- 4) For drawing root locus, the angle of asymptote yields the direction along which _____ branches approach to infinity.
 - a) $p + z$
 - b) $p - z$
 - c) p / z
 - d) $p * z$
- 5) What should be the nature of root locus about the real axis?
 - a) Asymmetric
 - b) Symmetric
 - c) Exponential
 - d) Decaying
- 6) Which unit is adopted for magnitude measurement in Bode plots?
 - a) Degree
 - b) Decimal
 - c) Decibel
 - d) Deviation
- 7) If a pole is located at origin, how does it get represented on the magnitude plot?
 - a) $-10 \log(\omega)$ dB
 - b) $-20 \log(\omega)$ dB
 - c) $-40 \log(\omega)$ dB
 - d) $-60 \log(\omega)$ dB
- 8) How is the sinusoidal transfer function obtained from the system transfer function in frequency domain?
 - a) Replacement of ' $j\omega$ ' by ' s '
 - b) Replacement of ' s ' by ' ω '
 - c) Replacement of ' s ' by ' $j\omega$ '
 - d) Replacement of ' ω ' by ' s '

- 9) In bode plot phase margin is calculated at _____.
a) Phase cross-over frequency b) Corner frequency
c) Any frequency d) Gain cross-over frequency
- 10) Which notation represents the feedback path in closed loop system representation?
a) $b(t)$ b) $c(t)$
c) $e(t)$ d) $r(t)$
- 11) The output signal is fed back at the input side from the _____ point.
a) Summing b) Differential
c) Take-off d) All of the above
- 12) While shifting a take-off point after the summing point, which among the following should be added?
a) Summing point in series with take-off point
b) Summing point in parallel with take-off point
c) Block of reciprocal transfer function
d) Block of inverse transfer function
- 13) In a signal flow graph, nodes are represented by small _____.
a) Circles b) Squares
c) Arrows d) Pointers
- 14) If finite numbers of blocks are connected in series or cascade configuration, then how are the blocks combined algebraically?
a) By addition b) By multiplication
c) By differentiation d) By integration

Seat No.	
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Set	S
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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Control System (BTN06401)

Day & Date: Wednesday, 22-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Attempt any four:

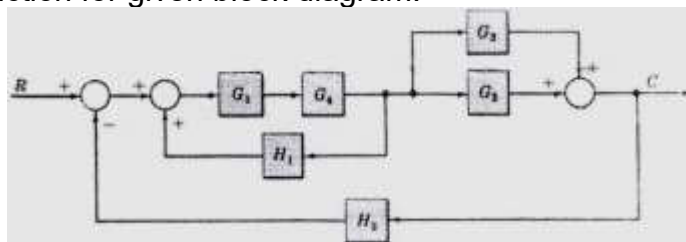
16

- Derive transfer function for closed loop control system.
- Explain missile launching and guidance system.
- Explain the rules for block diagram reduction technique.
- Explain Mason's gain formula.
- What is a "TYPES" of system? Explain type 0 and type 1 system.

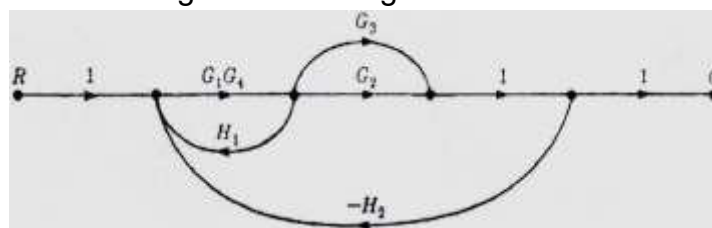
Q.3 Attempt any two:

12

- Explain time response specifications in detail.
- Find transfer function for given block diagram.



- Find transfer function for given SFG diagram.



Section – II

Q.4 Solve Any Four:

16

- Explain two special cases in Routh - Hurwitz criterion.
- Write a short note on Centroid, Root Loci, Angle of asymptotes, Angle of arrival and departure.
- What is bode plot? Explain the steps to sketch bode plot.
- What is Lag compensator? Obtain the transfer function and draw a pole-zero plot.
- Write a note on state transition matrix.

Q.5 Attempt any two:

- a) Determine the stability of the system using RH criterion
 $G(s) = 6(s + 1) / (s^4 + 2s^3 + 9s + 6)$ and $H(s) = 1$
- b) Sketch the bode plot for following transfer function and obtain gain and phase cross over frequency.
 $G(s)H(s) = 10/s(s + 1)(s + 10)$
- c) Sketch root locus for the system $G(s) = K(s + 4)/s^2 + 6s + 13$, $H(s) = 1$

Seat No.	
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Set **P**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Integrated Circuits (BTN06402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the given options. 14

- 1) When square wave signal is input to the differentiator then output is _____.
 a) Triangular wave b) Square wave
 c) Spikes d) None
- 2) Voltage series feedback circuit is also called as _____.
 a) Non inverting amplifier with feedback
 b) Closed loop non inverting amplifier
 c) Open loop non inverting amplifier
 d) Both a) and b)
- 3) The average rate of change of input offset voltage per unit change in temperature is called as _____.
 a) Thermal current drift b) Thermal voltage drift
 c) Both a) and b) d) None
- 4) The comparator with positive feedback is said to exhibits _____.
 a) Schmitt trigger b) hysteresis
 c) Dead band condition d) both b) and c)
- 5) Input supply VS for E-MOSFET is given to _____.
 a) Drain b) Gate
 c) Source d) Inverting terminal
- 6) IC 8038 is used to generate _____.
 a) Sine wave b) square wave
 c) Triangular wave d) all of above
- 7) For ZCD, $V_{ref} =$ _____.
 a) 1 V b) 2 V
 c) 3 V d) 0 V
- 8) For summing amplifier ratio of R_f/R should be _____.
 a) Less than one b) greater than one
 c) Zero d) One

- 9) V_{ocm}/V_{cm} represents _____.
a) CMRR
b) open loop voltage gain
c) A_{cm}
d) voltage rejection ratio
- 10) The gain of the basic differentiator increases with increase in frequency till it touches open loop response _____.
a) True
b) False
- 11) What is the purpose of the op amp within active filters?
a) Impedance matching
b) to alleviate filter losses
c) Easy adjustment over a wide frequency range
d) all of above
- 12) _____ circuit converts irregular shape into square wave or pulse.
a) Schmitt Trigger
b) Clamper
c) Peak Detector
d) Window Detector
- 13) Which of the following circuit is called as dc inserter?
a) dc amplifier
b) Schmitt trigger
c) Clampers
d) Zero crossing Detector
- 14) Active filters offers below advantages over passive filters _____.
a) Flexibility in design
b) Gain adjustment
c) Both a) and b)
d) None of these

Seat No.	
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Set P

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Integrated Circuits (BTN06402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figure to the right indicate full marks.

Section – I

Q.2 Attempt the Following. (Any Four) 16

- a) With a neat block diagram, explain basic op-amp.
- b) Explain any one of application of V-I converter with floating load.
- c) Prove that for a non-inverting amplifier with feedback, $f_f = f_o(1 + AB)$
- d) Explain V to I converter with floating load.
- e) Design an Inverting amplifier using op-amp 741 for closed loop gain of 7.

Q.3 Attempt the Following. (Any Two) 12

- a) With a neat diagram, derive expression for voltage series feedback amplifier.
- b) Explain Summing, Scaling and averaging amplifier in inverting configuration.
- c) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to 1 KHz.

Section – II

Q.4 Attempt the Following. (Any Four) 16

- a) Draw and explain astable multivibrator using IC 555 with output waveform.
- b) Explain square wave generator.
- c) Derive expression for log amplifier using diode.
- d) Explain positive clipper using op amp.
- e) Draw and explain Sample and Hold Circuit.

Q.5 Attempt the Following. (Any Two) 12

- a) Explain full wave precision rectifier.
- b) Draw and explain Wein bridge Oscillator with a proof of $f_0 = 1/2\pi RC$.
- c) Explain how a monostable multivibrator can be implemented with 555 IC with relevant waveforms and functional diagram. Derive an expression for pulse width.

Seat No.	
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Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks: 14

14

- Page 4 of 12

- 9) Voltage series feedback circuit is also called as _____.
a) Non inverting amplifier with feedback
b) Closed loop non inverting amplifier
c) Open loop non inverting amplifier
d) Both a) and b)
- 10) The average rate of change of input offset voltage per unit change in temperature is called as _____.
a) Thermal current drift
b) Thermal voltage drift
c) Both a) and b)
d) None
- 11) The comparator with positive feedback is said to exhibits _____.
a) Schmitt trigger
b) hysteresis
c) Dead band condition
d) both b) and c)
- 12) Input supply V_S for E-MOSFET is given to _____.
a) Drain
b) Gate
c) Source
d) Inverting terminal
- 13) IC 8038 is used to generate _____.
a) Sine wave
b) square wave
c) Triangular wave
d) all of above
- 14) For ZCD, V_{ref} = _____.
a) 1 V
b) 2 V
c) 3 V
d) 0 V

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Integrated Circuits (BTN06402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figure to the right indicate full marks.

Section – I

Q.2 Attempt the Following. (Any Four) 16

- a) With a neat block diagram, explain basic op-amp.
- b) Explain any one of application of V-I converter with floating load.
- c) Prove that for a non-inverting amplifier with feedback, $f_f = f_o(1 + AB)$
- d) Explain V to I converter with floating load.
- e) Design an Inverting amplifier using op-amp 741 for closed loop gain of 7.

Q.3 Attempt the Following. (Any Two) 12

- a) With a neat diagram, derive expression for voltage series feedback amplifier.
- b) Explain Summing, Scaling and averaging amplifier in inverting configuration.
- c) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to 1 KHz.

Section – II

Q.4 Attempt the Following. (Any Four) 16

- a) Draw and explain astable multivibrator using IC 555 with output waveform.
- b) Explain square wave generator.
- c) Derive expression for log amplifier using diode.
- d) Explain positive clipper using op amp.
- e) Draw and explain Sample and Hold Circuit.

Q.5 Attempt the Following. (Any Two) 12

- a) Explain full wave precision rectifier.
- b) Draw and explain Wein bridge Oscillator with a proof of $f_0 = 1/2\pi RC$.
- c) Explain how a monostable multivibrator can be implemented with 555 IC with relevant waveforms and functional diagram. Derive an expression for pulse width.

Seat No.	
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Set	R
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Integrated Circuits (BTN06402)

Day & Date: Friday, 24-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the given options.

14

- 1) What is the purpose of the op amp within active filters?
 a) Impedance matching
 b) to alleviate filter losses
 c) Easy adjustment over a wide frequency range
 d) all of above
- 2) _____ circuit converts irregular shape into square wave or pulse.
 a) Schmitt Trigger
 b) Clamper
 c) Peak Detector
 d) Window Detector
- 3) Which of the following circuit is called as dc inserter?
 a) dc amplifier
 b) Schmitt trigger
 c) Clampers
 d) Zero crossing Detector
- 4) Active filters offers below advantages over passive filters _____.
 a) Flexibility in design
 b) Gain adjustment
 c) Both a) and b)
 d) None of these
- 5) When square wave signal is input to the differentiator then output is _____.
 a) Triangular wave
 b) Square wave
 c) Spikes
 d) None
- 6) Voltage series feedback circuit is also called as _____.
 a) Non inverting amplifier with feedback
 b) Closed loop non inverting amplifier
 c) Open loop non inverting amplifier
 d) Both a) and b)
- 7) The average rate of change of input offset voltage per unit change in temperature is called as _____.
 a) Thermal current drift
 b) Thermal voltage drift
 c) Both a) and b)
 d) None
- 8) The comparator with positive feedback is said to exhibits _____.
 a) Schmitt trigger
 b) hysteresis
 c) Dead band condition
 d) both b) and c)

Seat No.	
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Set R

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Integrated Circuits (BTN06402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figure to the right indicate full marks.

Section – I

Q.2 Attempt the Following. (Any Four) 16

- a) With a neat block diagram, explain basic op-amp.
- b) Explain any one of application of V-I converter with floating load.
- c) Prove that for a non-inverting amplifier with feedback, $f_f = f_o(1 + AB)$
- d) Explain V to I converter with floating load.
- e) Design an Inverting amplifier using op-amp 741 for closed loop gain of 7.

Q.3 Attempt the Following. (Any Two) 12

- a) With a neat diagram, derive expression for voltage series feedback amplifier.
- b) Explain Summing, Scaling and averaging amplifier in inverting configuration.
- c) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to 1 KHz.

Section – II

Q.4 Attempt the Following. (Any Four) 16

- a) Draw and explain astable multivibrator using IC 555 with output waveform.
- b) Explain square wave generator.
- c) Derive expression for log amplifier using diode.
- d) Explain positive clipper using op amp.
- e) Draw and explain Sample and Hold Circuit.

Q.5 Attempt the Following. (Any Two) 12

- a) Explain full wave precision rectifier.
- b) Draw and explain Wein bridge Oscillator with a proof of $f_0 = 1/2\pi RC$.
- c) Explain how a monostable multivibrator can be implemented with 555 IC with relevant waveforms and functional diagram. Derive an expression for pulse width.

Seat No.	
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Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks: 14

14

- Page 10 of 12

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Seat No.	
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Set S

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Analog Integrated Circuits (BTN06402)

Day & Date: Friday, 24-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
2) Figure to the right indicate full marks.

Section – I

Q.2 Attempt the Following. (Any Four) 16

- a) With a neat block diagram, explain basic op-amp.
- b) Explain any one of application of V-I converter with floating load.
- c) Prove that for a non-inverting amplifier with feedback, $f_f = f_o(1 + AB)$
- d) Explain V to I converter with floating load.
- e) Design an Inverting amplifier using op-amp 741 for closed loop gain of 7.

Q.3 Attempt the Following. (Any Two) 12

- a) With a neat diagram, derive expression for voltage series feedback amplifier.
- b) Explain Summing, Scaling and averaging amplifier in inverting configuration.
- c) Design a differentiator to differentiate an input signal that varies in frequency from 10 Hz to 1 KHz.

Section – II

Q.4 Attempt the Following. (Any Four) 16

- a) Draw and explain astable multivibrator using IC 555 with output waveform.
- b) Explain square wave generator.
- c) Derive expression for log amplifier using diode.
- d) Explain positive clipper using op amp.
- e) Draw and explain Sample and Hold Circuit.

Q.5 Attempt the Following. (Any Two) 12

- a) Explain full wave precision rectifier.
- b) Draw and explain Wein bridge Oscillator with a proof of $f_0 = 1/2\pi RC$.
- c) Explain how a monostable multivibrator can be implemented with 555 IC with relevant waveforms and functional diagram. Derive an expression for pulse width.

Seat No.	
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Day & Date: Sunday, 26-05-2024
Time: 10:00 AM To 01:00 PM

Instructions: 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
3) Figures to the right indicates full marks.

Marks: 14

14

- Page 1 of 16

- 8) The data rate of QPSK is _____ of BPSK.

 - a) twice
 - b) thrice
 - c) same
 - d) four times
- 9) In coherent detection of signals, _____.

 - a) Carrier of frequency and phase as same as transmitted carrier is generated
 - b) The carrier is in synchronization with modulated carrier
 - c) Local carrier is generated
 - d) All of the above
- 10) How many carrier frequencies are used in BASK?

 - a) 4
 - b) 2
 - c) 1
 - d) none of these
- 11) Granular noise is associated with _____.

 - a) PCM
 - b) DPCM
 - c) DM
 - d) QAM
- 12) In a linear block code the _____ of any two valid codewords creates another valid code words.

 - a) XORing
 - b) ANDING
 - c) ORing
 - d) none of these
- 13) Modulation technique most affected by noise is _____.

 - a) FSK
 - b) PSK
 - c) QPSK
 - d) ASK
- 14) Which of the following can not be a member of matrix P?

 - a) 101
 - b) 011
 - c) 111
 - d) 010

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Principles of Digital Communication (BTN06403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

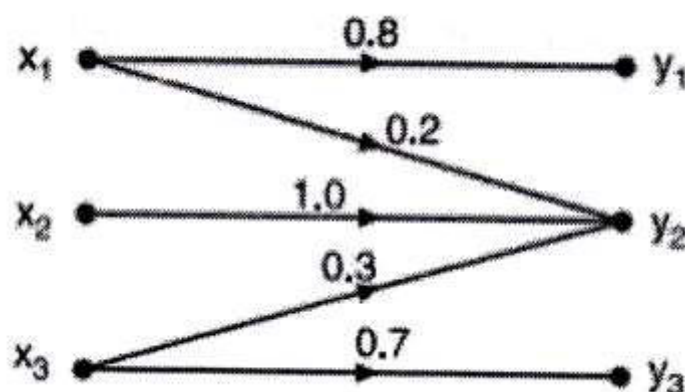
Section – I

Q.2 Attempt the following. (Any Four) **16**

- Explain generation of ASK from baseband signal.
- Compare the two modulation schemes BPSK and BFSK.
- Consider a source X which produces six symbols with probabilities $1/8, 1/8, 1/8, 1/8, 1/4$ and $1/4$. Find the source entropy $H(X)$.
- Explain the errors in delta modulation.
- What is information and entropy? What are its units?

Q.3 Attempt the following. (Any Two) **12**

- Discuss in detail the Delta Transmitter and Receiver.
- Apply the Huffman code for the following message source, calculate entropy, avg. codeword length & transmission efficiency of this code.
 $[X] = [x_1 x_2 x_3 x_4 x_5 x_6 x_7 x_8]$
 $[P] = [1/4 \ 1/8 \ 1/16 \ 1/16 \ 1/16 \ 1/4 \ 1/16 \ 1/8]$
- A discrete source transmits messages x_1, x_2 and x_3 with probabilities 0.3, 0.4 and 0.3. The source is connected to the channel given in figure. Calculate $H(X)$ and $H(Y)$.



Section – II

Q.4 Answer the following. (Any Four)**16**

- a) What are block codes? Explain.
- b) Explain matched filter.
- c) What is QASK or QAM?
- d) Write a note integrator and dump receiver.
- e) Explain how the error is corrected in block codes.

Q.5 Attempt the following. (Any Two)**12**

- a) An error control code has the following parity check matrix.

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

- i) Determine the generator matrix G
 - ii) Find the code word that begin with 101
 - iii) Decode the received code word 1 1 0 1 1 0
- b) Explain the M-ary PSK transmitter and receiver with block diagram.
- c) Draw and explain QPSK transmitter and receiver.

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Principles of Digital Communication (BTN06403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) The data rate of QPSK is _____ of BPSK.
 - a) twice
 - b) thrice
 - c) same
 - d) four times
- 2) In coherent detection of signals, _____.
 - a) Carrier of frequency and phase as same as transmitted carrier is generated
 - b) The carrier is in synchronization with modulated carrier
 - c) Local carrier is generated
 - d) All of the above
- 3) How many carrier frequencies are used in BASK?
 - a) 4
 - b) 2
 - c) 1
 - d) none of these
- 4) Granular noise is associated with _____.
 - a) PCM
 - b) DPCM
 - c) DM
 - d) QAM
- 5) In a linear block code the _____ of any two valid codewords creates another valid code words.
 - a) XORing
 - b) ANDING
 - c) ORing
 - d) none of these
- 6) Modulation technique most affected by noise is _____.
 - a) FSK
 - b) PSK
 - c) QPSK
 - d) ASK
- 7) Which of the following can not be a member of matrix P?
 - a) 101
 - b) 011
 - c) 111
 - d) 010
- 8) The expected information contained in a message is called _____.
 - a) Entropy
 - b) Efficiency
 - c) Coded signal
 - d) None of the above

- 9) The entropy of a message source generating 4 message with probability. 0.5, 0.25, 0.125 and 0.125 is _____.
a) 1 b/message b) 1.75 b/message
c) 3.32 b/message d) 5.93 b/message
- 10) In _____ the frequency of the carrier is varied according to information in digital signal.
a) QPSK b) ASK
c) FSK d) PSK
- 11) In Binary Phase Shift Keying system, the binary symbols 1 and 0 are represented by carrier with phase shift of _____.
a) Π b) $\Pi/2$
c) 2Π d) 0
- 12) QAM stands for:
a) Quadrature Amplitude Modulation
b) Quadrature Amplitude Masking
c) Quadrature Amplitude Marking
d) none of the above
- 13) Which of the following is not a digital-to-analog conversion?
a) FSK b) ASK
c) PSK d) AM
- 14) QPSK is a modulation scheme where each symbol consists of _____.
a) 4 bits b) M bits
c) 2 bits d) 1 bit

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Principles of Digital Communication (BTN06403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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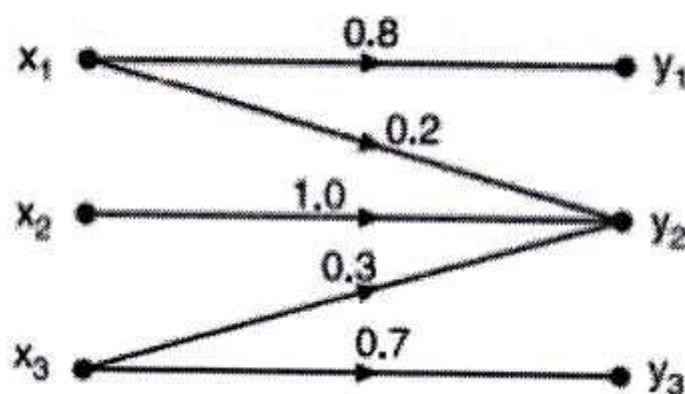
Section – I

Q.2 Attempt the following. (Any Four) **16**

- Explain generation of ASK from baseband signal.
- Compare the two modulation schemes BPSK and BFSK.
- Consider a source X which produces six symbols with probabilities $1/8, 1/8, 1/8, 1/8, 1/4$ and $1/4$. Find the source entropy $H(X)$.
- Explain the errors in delta modulation.
- What is information and entropy? What are its units?

Q.3 Attempt the following. (Any Two) **12**

- Discuss in detail the Delta Transmitter and Receiver.
- Apply the Huffman code for the following message source, calculate entropy, avg. codeword length & transmission efficiency of this code.
 $[X] = [x_1 x_2 x_3 x_4 x_5 x_6 x_7 x_8]$
 $[P] = [1/4 \ 1/8 \ 1/16 \ 1/16 \ 1/16 \ 1/4 \ 1/16 \ 1/8]$
- A discrete source transmits messages x_1, x_2 and x_3 with probabilities 0.3, 0.4 and 0.3. The source is connected to the channel given in figure. Calculate $H(X)$ and $H(Y)$.



Section – II

Q.4 Answer the following. (Any Four)**16**

- a) What are block codes? Explain.
- b) Explain matched filter.
- c) What is QASK or QAM?
- d) Write a note integrator and dump receiver.
- e) Explain how the error is corrected in block codes.

Q.5 Attempt the following. (Any Two)**12**

- a) An error control code has the following parity check matrix.

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

- i) Determine the generator matrix G
- ii) Find the code word that begin with 101
- iii) Decode the received code word 1 1 0 1 1 0
- b) Explain the M-ary PSK transmitter and receiver with block diagram.
- c) Draw and explain QPSK transmitter and receiver.

R

- 9) QAM stands for:
- a) Quadrature Amplitude Modulation
 - b) Quadrature Amplitude Masking
 - c) Quadrature Amplitude Marking
 - d) none of the above
- 10) Which of the following is not a digital-to-analog conversion?
- a) FSK
 - b) ASK
 - c) PSK
 - d) AM
- 11) QPSK is a modulation scheme where each symbol consists of ____.
- a) 4 bits
 - b) M bits
 - c) 2 bits
 - d) 1 bit
- 12) The data rate of QPSK is _____ of BPSK.
- a) twice
 - b) thrice
 - c) same
 - d) four times
- 13) In coherent detection of signals, ____.
- a) Carrier of frequency and phase as same as transmitted carrier is generated
 - b) The carrier is in synchronization with modulated carrier
 - c) Local carrier is generated
 - d) All of the above
- 14) How many carrier frequencies are used in BASK?
- a) 4
 - b) 2
 - c) 1
 - d) none of these

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Principles of Digital Communication (BTN06403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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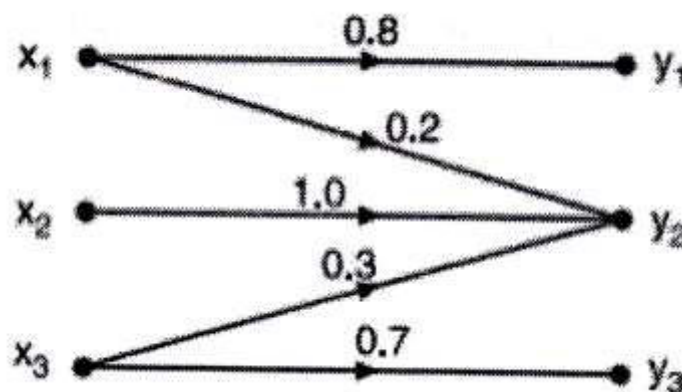
Section – I

Q.2 Attempt the following. (Any Four) **16**

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- Compare the two modulation schemes BPSK and BFSK.
- Consider a source X which produces six symbols with probabilities $1/8, 1/8, 1/8, 1/8, 1/4$ and $1/4$. Find the source entropy $H(X)$.
- Explain the errors in delta modulation.
- What is information and entropy? What are its units?

Q.3 Attempt the following. (Any Two) **12**

- Discuss in detail the Delta Transmitter and Receiver.
- Apply the Huffman code for the following message source, calculate entropy, avg. codeword length & transmission efficiency of this code.
 $[X] = [x_1 x_2 x_3 x_4 x_5 x_6 x_7 x_8]$
 $[P] = [1/4 \ 1/8 \ 1/16 \ 1/16 \ 1/16 \ 1/4 \ 1/16 \ 1/8]$
- A discrete source transmits messages x_1, x_2 and x_3 with probabilities 0.3, 0.4 and 0.3. The source is connected to the channel given in figure. Calculate $H(X)$ and $H(Y)$.



Section – II

Q.4 Answer the following. (Any Four)**16**

- a) What are block codes? Explain.
- b) Explain matched filter.
- c) What is QASK or QAM?
- d) Write a note integrator and dump receiver.
- e) Explain how the error is corrected in block codes.

Q.5 Attempt the following. (Any Two)**12**

- a) An error control code has the following parity check matrix.

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

- i) Determine the generator matrix G
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- iii) Decode the received code word 1 1 0 1 1 0
- b) Explain the M-ary PSK transmitter and receiver with block diagram.
- c) Draw and explain QPSK transmitter and receiver.

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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Principles of Digital Communication (BTN06403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Which of the following is not a digital-to-analog conversion?

a) FSK	b) ASK
c) PSK	d) AM
- 2) QPSK is a modulation scheme where each symbol consists of _____.

a) 4 bits	b) M bits
c) 2 bits	d) 1 bit
- 3) The data rate of QPSK is _____ of BPSK.

a) twice	b) thrice
c) same	d) four times
- 4) In coherent detection of signals, _____.

a) Carrier of frequency and phase as same as transmitted carrier is generated
b) The carrier is in synchronization with modulated carrier
c) Local carrier is generated
d) All of the above
- 5) How many carrier frequencies are used in BASK?

a) 4	b) 2
c) 1	d) none of these
- 6) Granular noise is associated with _____.

a) PCM	b) DPCM
c) DM	d) QAM
- 7) In a linear block code the _____ of any two valid codewords creates another valid code words.

a) XORing	b) ANDING
c) ORing	d) none of these
- 8) Modulation technique most affected by noise is _____.

a) FSK	b) PSK
c) QPSK	d) ASK

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Principles of Digital Communication (BTN06403)

Day & Date: Sunday, 26-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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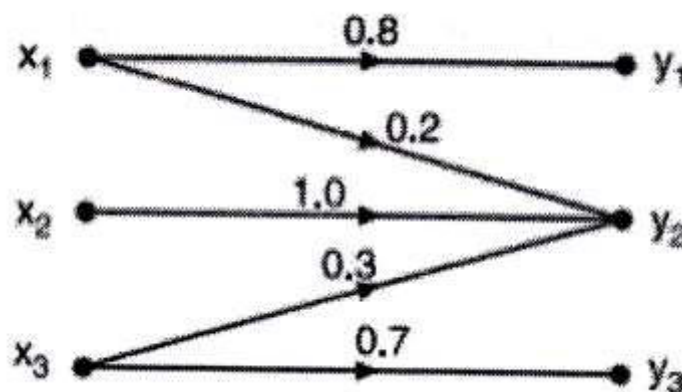
Section – I

Q.2 Attempt the following. (Any Four) **16**

- Explain generation of ASK from baseband signal.
- Compare the two modulation schemes BPSK and BFSK.
- Consider a source X which produces six symbols with probabilities $1/8, 1/8, 1/8, 1/8, 1/4$ and $1/4$. Find the source entropy $H(X)$.
- Explain the errors in delta modulation.
- What is information and entropy? What are its units?

Q.3 Attempt the following. (Any Two) **12**

- Discuss in detail the Delta Transmitter and Receiver.
- Apply the Huffman code for the following message source, calculate entropy, avg. codeword length & transmission efficiency of this code.
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 $[P] = [1/4 \ 1/8 \ 1/16 \ 1/16 \ 1/16 \ 1/4 \ 1/16 \ 1/8]$
- A discrete source transmits messages x_1, x_2 and x_3 with probabilities 0.3, 0.4 and 0.3. The source is connected to the channel given in figure. Calculate $H(X)$ and $H(Y)$.



Section – II

Q.4 Answer the following. (Any Four)**16**

- a) What are block codes? Explain.
- b) Explain matched filter.
- c) What is QASK or QAM?
- d) Write a note integrator and dump receiver.
- e) Explain how the error is corrected in block codes.

Q.5 Attempt the following. (Any Two)**12**

- a) An error control code has the following parity check matrix.

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

- i) Determine the generator matrix G
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 - iii) Decode the received code word 1 1 0 1 1 0
- b) Explain the M-ary PSK transmitter and receiver with block diagram.
- c) Draw and explain QPSK transmitter and receiver.

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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Signals and Systems (BTN06404)

Day & Date: Tuesday, 28-05-2024
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:**
- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 - 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 - 3) Figures to the right indicates full marks.
 - 4) Use of nonprogrammable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- Dynamic system is characterized by _____.
 - Linear equation
 - Quadratic equation
 - Differential equation
 - Statistical parameter
- $x(t) = e^{-5t}u(t)$
 - Energy signal
 - Power signal
 - both a & b
 - None
- Which of the following is Non periodic signal _____.
 - $x(t) = \cos^2(t)$
 - $x(t) = \cos 2\pi t u(t)$
 - $x(t) = \sin\left(\frac{2\pi}{3}t\right)$
 - $x(t) = \sin^2(t)$
- Convolution is used to find:
 - The impulse response of an LTI System
 - Frequency response of a System
 - The time response of a LTI system
 - The phase response of a LTI system
- If $x(-n)$ is signal with $x(n) = 0$; for $n < -2, n > 4$ then $x(n-3)$ is guaranteed to be zero for _____.
 - $n < 0, n > 7$
 - $n < -1, n < 6$
 - $n < 1, n > 7$
 - $n > -1, n < 5$
- If $F_1(t)*F_2(t) = C(t)$ then $F_1(t-T_1)*F_2(t-T_2)$ is _____.
 - $C(t+T_1+T_2)$
 - $C(t)$
 - $C(t-T_1-T_2)$
 - $C(t-T_1T_2)$
- If h_1, h_2 and h_3 are cascaded, find the overall impulse response _____.
 - $h_1*h_2*h_3$
 - $h_1 + h_2 + h_3$
 - $h_3,$
 - All of the mentioned
- Find the value of $(t-34)*x(t+56), d(t)$ being the delta function.
 - $x(t+56),$
 - $x(t+32),$
 - $x(t+22),$
 - $x(t-22),$

Seat No.	
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Set	P
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Signals and Systems (BTN06404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Solve any Four of the Following:

16

- Determine whether the following signal is periodic or not. If periodic, find fundamental period.
 - $x(t) = 3\cos[4t + (\pi/3)]$
 - $x[n] = \sin[\frac{6\pi n}{7} + 1]$
- Check whether following system is static/dynamic and causal/non-causal
 $y(n) = x(n) + x(n - 1)$
- Find convolution using graphical method $x[n] = \{1, 2, 3, 2\}$ and $h[n] = \{1, 2, 3\}$
- Obtain convolution for LTI system with input $x(n)$ & unit impulse response $h(n)$ given as
 $x(n) = (0.5)^n u(n)$ and $h(n) = u(n)$
- Obtain direct form -I and II realization for the system described by the differential equation.

$$\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t) + \frac{d^2x(t)}{dt^2}$$

Q.3 Solve any two of the Following.

12

- Check whether following system $y(t) = \text{even}[x(t)]$ is
 - Static or dynamic
 - Linear or non-linear
 - Causal or non-causal
 - Time variant or invariant
- Determine convolution sum of
 $x(n) = \cos \pi n u(n)$ and $h(n) = \left(\frac{1}{2}\right)^n u(n)$
- Obtain block diagram realization of Direct form – I & II by for system described difference equation
 $y(n) - \frac{5}{6}y(n-1) + \frac{1}{6}y(n-2) = x(n) + 2x(n-1)$

Section – II**Q.4 Solve any Four of the following. 16**

- a) State & explain sampling theorem in detail.
- b) Analog signal $m(t) = 4 \cos(50\pi t) + 8 \sin(300\pi t) - \cos(100\pi t)$ Find Nyquist rate and Nyquist interval.
- c) State & explain in brief the necessary & sufficient conditions of existence of fourier series representation for signal in detail.
- d) Find the Fourier transform of $x(t) = e^{-at}$ for $a > 0$
- e) Find ZT & sketch ROC
 $x(n) = (0.6)^n u(n) + (0.4)^n u(n)$

Q.5 Solve any two of the following. 12

- a) Obtain convolution of following using convolution property of FT
 $x(t) = e^{-bt} u(t)$ where $b > 0$
 $y(t) = e^{-at} u(t)$ where $a > 0$
 Find LTI system in freq & time domain
- b) List the properties of FT and Explain any two property
- c) Find:
 ZT of $x(n) = n^2 u(n)$

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Find the value of $(t - 34) * x(t + 56)$, $d(t)$ being the delta function.
 - a) $x(t + 56)$,
 - b) $x(t + 32)$,
 - c) $x(t + 22)$,
 - d) $x(t - 22)$,
- 2) If $x_1(t) = x_2(t) = u(t)$ then $x_1(t) * x_2(t)$ is _____.
 - a) $u(t)$
 - b) $u(t^2)$
 - c) $t u(t)$
 - d) $t^2/2 u(t)$
- 3) For signal $x(t) = 1 + \cos 20\pi t + \cos 70\pi t$, Nyquist rate is _____.
 - a) 45Hz
 - b) 40Hz
 - c) 140Hz
 - d) 70Hz
- 4) Sampling theorem is applicable to CT _____.
 - a) Band limited signal
 - b) Band undefined
 - c) Any signal
 - d) Stochastic signal
- 5) Periodic signals will have _____.
 - a) Finite number of maxima & zero minima in one period
 - b) infinite number of maxima & finite number of minima in one period
 - c) Finite number of maxima & minima in one period
 - d) Finite number of maxima & infinite number of minima
- 6) FT of $F(j\omega)$ of arbitrary signal has property _____.
 - a) $F(j\omega) = F(-j\omega)$
 - b) $F(j\omega) = -F(-j\omega)$
 - c) $F(j\omega) = F^*(j\omega)$
 - d) $F(j\omega) = -F^*(j\omega)$
- 7) Inverse ZT of $aZ/(Z - a)^2$
 - a) $a^n u(n)$
 - b) $a^2 u(n)$
 - c) $2a^2 u(n)$
 - d) $na^n u(n)$
- 8) Dynamic system is characterized by _____.
 - a) Linear equation
 - b) Quadratic equation
 - c) Differential equation
 - d) Statistical parameter

Seat No.	
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Set **Q**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Signals and Systems (BTN06404)

Day & Date: Tuesday, 28-05-2024
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Max. Marks: 56

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Section – I

Q.2 Solve any Four of the Following:

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- Determine whether the following signal is periodic or not. If periodic, find fundamental period.
 - $x(t) = 3\cos[4t + (\pi/3)]$
 - $x[n] = \sin[\frac{6\pi n}{7} + 1]$
- Check whether following system is static/dynamic and causal/non-causal
 $y(n) = x(n) + x(n - 1)$
- Find convolution using graphical method $x[n] = \{1, 2, 3, 2\}$ and $h[n] = \{1, 2, 3\}$
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Q.3 Solve any two of the Following.

12

- Check whether following system $y(t) = \text{even}[x(t)]$ is
 - Static or dynamic
 - Linear or non-linear
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 - Time variant or invariant
- Determine convolution sum of
 $x(n) = \cos \pi n u(n)$ and $h(n) = \left(\frac{1}{2}\right)^n u(n)$
- Obtain block diagram realization of Direct form – I & II by for system described difference equation
 $y(n) - \frac{5}{6}y(n-1) + \frac{1}{6}y(n-2) = x(n) + 2x(n-1)$

Section – II**Q.4 Solve any Four of the following. 16**

- a) State & explain sampling theorem in detail.
- b) Analog signal $m(t) = 4 \cos(50\pi t) + 8 \sin(300\pi t) - \cos(100\pi t)$ Find Nyquist rate and Nyquist interval.
- c) State & explain in brief the necessary & sufficient conditions of existence of fourier series representation for signal in detail.
- d) Find the Fourier transform of $x(t) = e^{-at}$ for $a > 0$
- e) Find ZT & sketch ROC
 $x(n) = (0.6)^n u(n) + (0.4)^n u(n)$

Q.5 Solve any two of the following. 12

- a) Obtain convolution of following using convolution property of FT
 $x(t) = e^{-bt} u(t)$ where $b > 0$
 $y(t) = e^{-at} u(t)$ where $a > 0$
 Find LTI system in freq & time domain
- b) List the properties of FT and Explain any two property
- c) Find:
 ZT of $x(n) = n^2 u(n)$

Seat No.	
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Set R

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Signals and Systems (BTN06404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.
 4) Use of nonprogrammable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) Sampling theorem is applicable to CT _____.
 a) Band limited signal b) Band undefined
 c) Any signal d) Stochastic signal
- 2) Periodic signals will have _____.
 a) Finite number of maxima & zero minima in one period
 b) infinite number of maxima & finite number of minima in one period
 c) Finite number of maxima & minima in one period
 d) Finite number of maxima & infinite number of minima
- 3) FT of $F(j\omega)$ of arbitrary signal has property _____.
 a) $F(j\omega) = F(-j\omega)$ b) $F(j\omega) = -F(-j\omega)$
 c) $F(j\omega) = F^*(j\omega)$ d) $F(j\omega) = -F^*(j\omega)$
- 4) Inverse ZT of $aZ/(Z - a)^2$
 a) $a^n u(n)$ b) $a^2 u(n)$
 c) $2a^2 u(n)$ d) $na^n u(n)$
- 5) Dynamic system is characterized by _____.
 a) Linear equation b) Quadratic equation
 c) Differential equation d) Statistical parameter
- 6) $x(t) = e^{-5t} u(t)$
 a) Energy signal b) Power signal
 c) both a & b d) None
- 7) Which of the following is Non periodic signal _____.
 a) $x(t) = \cos^2(t)$ b) $x(t) = \cos 2\pi t u(t)$
 c) $x(t) = \sin\left(\frac{2\pi}{3}t\right)$ d) $x(t) = \sin^2(t)$
- 8) Convolution is used to find:
 a) The impulse response of an LTI System
 b) Frequency response of a System
 c) The time response of a LTI system
 d) The phase response of a LTI system

Seat No.	
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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Signals and Systems (BTN06404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Solve any Four of the Following:

16

- Determine whether the following signal is periodic or not. If periodic, find fundamental period.
 - $x(t) = 3\cos[4t + (\pi/3)]$
 - $x[n] = \sin[\frac{6\pi n}{7} + 1]$
- Check whether following system is static/dynamic and causal/non-causal
 $y(n) = x(n) + x(n - 1)$
- Find convolution using graphical method $x[n] = \{1, 2, 3, 2\}$ and $h[n] = \{1, 2, 3\}$
- Obtain convolution for LTI system with input $x(n)$ & unit impulse response $h(n)$ given as
 $x(n) = (0.5)^n u(n)$ and $h(n) = u(n)$
- Obtain direct form -I and II realization for the system described by the differential equation.

$$\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t) + \frac{d^2x(t)}{dt^2}$$

Q.3 Solve any two of the Following.

12

- Check whether following system $y(t) = \text{even}[x(t)]$ is
 - Static or dynamic
 - Linear or non-linear
 - Causal or non-causal
 - Time variant or invariant
- Determine convolution sum of
 $x(n) = \cos \pi n u(n)$ and $h(n) = \left(\frac{1}{2}\right)^n u(n)$
- Obtain block diagram realization of Direct form – I & II by for system described difference equation
 $y(n) - \frac{5}{6}y(n-1) + \frac{1}{6}y(n-2) = x(n) + 2x(n-1)$

Section – II**Q.4 Solve any Four of the following.** **16**

- a) State & explain sampling theorem in detail.
- b) Analog signal $m(t) = 4 \cos(50\pi t) + 8 \sin(300\pi t) - \cos(100\pi t)$ Find Nyquist rate and Nyquist interval.
- c) State & explain in brief the necessary & sufficient conditions of existence of fourier series representation for signal in detail.
- d) Find the Fourier transform of $x(t) = e^{-at}$ for $a > 0$
- e) Find ZT & sketch ROC
 $x(n) = (0.6)^n u(n) + (0.4)^n u(n)$

Q.5 Solve any two of the following. **12**

- a) Obtain convolution of following using convolution property of FT
 $x(t) = e^{-bt} u(t)$ where $b > 0$
 $y(t) = e^{-at} u(t)$ where $a > 0$
 Find LTI system in freq & time domain
- b) List the properties of FT and Explain any two property
- c) Find:
 ZT of $x(n) = n^2 u(n)$

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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Signals and Systems (BTN06404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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 3) Figures to the right indicates full marks.
 4) Use of nonprogrammable calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct alternatives from the options.

14

- 1) If $F_1(t) * F_2(t) = C(t)$ then $F_1(t - T_1) * F_2(t - T_2)$ is _____.
 a) $C(t + T_1 + T_2)$ b) $C(t)$
 c) $C(t - T_1 - T_2)$ d) $C(t - T_1 T_2)$
- 2) If h_1, h_2 and h_3 are cascaded, find the overall impulse response _____.
 a) $h_1 * h_2 * h_3$ b) $h_1 + h_2 + h_3$
 c) h_3 , d) All of the mentioned
- 3) Find the value of $(t - 34) * x(t + 56)$, $d(t)$ being the delta function.
 a) $x(t + 56)$, b) $x(t + 32)$,
 c) $x(t + 22)$, d) $x(t - 22)$,
- 4) If $x_1(t) = x_2(t) = u(t)$ then $x_1(t) * x_2(t)$ is _____.
 a) $u(t)$ b) $u(t^2)$
 c) $t u(t)$ d) $t^2 / 2 u(t)$
- 5) For signal $x(t) = 1 + \cos 20\pi t + \cos 70\pi t$, Nyquist rate is _____.
 a) 45Hz b) 40Hz
 c) 140Hz d) 70Hz
- 6) Sampling theorem is applicable to CT _____.
 a) Band limited signal b) Band undefined
 c) Any signal d) Stochastic signal
- 7) Periodic signals will have _____.
 a) Finite number of maxima & zero minima in one period
 b) infinite number of maxima & finite number of minima in one period
 c) Finite number of maxima & minima in one period
 d) Finite number of maxima & infinite number of minima
- 8) FT of $F(j\omega)$ of arbitrary signal has property _____.
 a) $F(j\omega) = F(-j\omega)$ b) $F(j\omega) = -F(-j\omega)$
 c) $F(j\omega) = F^*(j\omega)$ d) $F(j\omega) = -F^*(j\omega)$

- 9) Inverse ZT of $aZ/(Z - a)^2$
 - a) $a^n u(n)$
 - b) $a^2 u(n)$
 - c) $2a^2 u(n)$
 - d) $na^n u(n)$
- 10) Dynamic system is characterized by _____.
 - a) Linear equation
 - b) Quadratic equation
 - c) Differential equation
 - d) Statistical parameter
- 11) $x(t) = e^{-5t} u(t)$
 - a) Energy signal
 - b) Power signal
 - c) both a & b
 - d) None
- 12) Which of the following is Non periodic signal _____.
 - a) $x(t) = \cos^2(t)$
 - b) $x(t) = \cos 2\pi t u(t)$
 - c) $x(t) = \sin\left(\frac{2\pi}{3}t\right)$
 - d) $x(t) = \sin^2(t)$
- 13) Convolution is used to find:
 - a) The impulse response of an LTI System
 - b) Frequency response of a System
 - c) The time response of a LTI system
 - d) The phase response of a LTI system
- 14) if $x(-n)$ is signal with $x(n) = 0$; for $n < -2, n > 4$ then $x(n - 3)$ is guaranteed to be zero for _____.
 - a) $n < 0, n > 7$
 - b) $n < -1, n < 6$
 - c) $n < 1, n > 7$
 - d) $n > -1, n < 5$

Seat No.	
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Set **S**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Signals and Systems (BTN06404)

Day & Date: Tuesday, 28-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicates full marks.

Section – I

Q.2 Solve any Four of the Following:

16

- Determine whether the following signal is periodic or not. If periodic, find fundamental period.
 - $x(t) = 3\cos[4t + (\pi/3)]$
 - $x[n] = \sin[\frac{6\pi n}{7} + 1]$
- Check whether following system is static/dynamic and causal/non-causal
 $y(n) = x(n) + x(n - 1)$
- Find convolution using graphical method $x[n] = \{1, 2, 3, 2\}$ and $h[n] = \{1, 2, 3\}$
- Obtain convolution for LTI system with input $x(n)$ & unit impulse response $h(n)$ given as
 $x(n) = (0.5)^n u(n)$ and $h(n) = u(n)$
- Obtain direct form -I and II realization for the system described by the differential equation.

$$\frac{d^2y(t)}{dt^2} - \frac{dy(t)}{dt} - 2y(t) = x(t) + \frac{d^2x(t)}{dt^2}$$

Q.3 Solve any two of the Following.

12

- Check whether following system $y(t) = \text{even}[x(t)]$ is
 - Static or dynamic
 - Linear or non-linear
 - Causal or non-causal
 - Time variant or invariant
- Determine convolution sum of
 $x(n) = \cos \pi n u(n)$ and $h(n) = \left(\frac{1}{2}\right)^n u(n)$
- Obtain block diagram realization of Direct form – I & II by for system described difference equation
 $y(n) - \frac{5}{6}y(n - 1) + \frac{1}{6}y(n - 2) = x(n) + 2x(n - 1)$

Section – II**Q.4 Solve any Four of the following. 16**

- a) State & explain sampling theorem in detail.
- b) Analog signal $m(t) = 4 \cos(50\pi t) + 8 \sin(300\pi t) - \cos(100\pi t)$ Find Nyquist rate and Nyquist interval.
- c) State & explain in brief the necessary & sufficient conditions of existence of fourier series representation for signal in detail.
- d) Find the Fourier transform of $x(t) = e^{-at}$ for $a > 0$
- e) Find ZT & sketch ROC
 $x(n) = (0.6)^n u(n) + (0.4)^n u(n)$

Q.5 Solve any two of the following. 12

- a) Obtain convolution of following using convolution property of FT
 $x(t) = e^{-bt} u(t)$ where $b > 0$
 $y(t) = e^{-at} u(t)$ where $a > 0$
 Find LTI system in freq & time domain
- b) List the properties of FT and Explain any two property
- c) Find:
 ZT of $x(n) = n^2 u(n)$

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Set	P
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Data Structures (BTN06405)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
 3) Figures to the right indicates full marks.

MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Queues serve major role in _____.
 a) Simulation of recursion
 b) Simulation of arbitrary linked list
 c) Simulation of limited resource allocation
 d) Simulation of heap sort

- 2) Consider the following definition in c programming language.

```
struct node
{
  int data;
  struct node * next;
}
typedef struct node NODE;
NODE *ptr;
```

 Which of the following c code is used to create new node?
 a) `ptr = (NODE*)malloc(sizeof(NODE));`
 b) `ptr = (NODE*)malloc(NODE);`
 c) `ptr = (NODE*)malloc(sizeof(NODE*));`
 d) `ptr = (NODE)malloc(sizeof(NODE));`

- 3) What would be the asymptotic time complexity to insert an element at the front of the linked list (head is known)?
 a) $O(1)$
 b) $O(n)$
 c) $O(n^2)$
 d) $O(n^3)$

- 4) The Data structure used in standard implementation of Breadth First Search is _____.
 a) Stack
 b) Queue
 c) Linked list
 d) None of the above

- 5) Overflow condition of queue is _____.
 a) `rear==max-1`
 b) `top==max-1`
 c) `front==max-1`
 d) both a)&b)

- 6) Infinite recursion leads to _____.
a) Overflow of run time stack
b) Under flow of register usage
c) Overflow of I/O cycle
d) Underflow of runtime stack
- 7) Adding an element to the stack means _____.
a) Placing an element at the front end
b) placing an element at the top
c) Placing an element at the rear end
d) None of the above
- 8) Linked list is considered as an example of _____ type of memory allocation.
a) Dynamic
b) Static
c) Compile time
d) None of the above
- 9) In linked list each node contain minimum of two fields. One field is data field to store the data second field is _____.
a) Pointer to character
b) Pointer to integer
c) Pointer to node
d) None of the above
- 10) Which of the following statement about binary tree is CORRECT?
a) Every binary tree is either complete or full
b) Every complete binary tree is also a full binary tree
c) Every full binary tree is also a complete binary tree
d) A binary tree cannot be both complete and full
- 11) If a node having two children is to be deleted from binary search tree, it is replaced by its _____.
a) In-order predecessor
b) In-order successor
c) both a) & b
d) None
- 12) A graph is a collection of nodes, called _____ And line segments called arcs or _____ that connect pair of nodes.
a) vertices, edges
b) edges, vertices
c) vertices, paths
d) graph node, edges
- 13) What is the worst and average case time complexity in the binary search tree?
a) $O(n^2)$
b) $O(n)$
c) $O(1)$
d) $O(\log n)$
- 14) In Bubble sort Single Run of comparing data items in an array is known as _____.
a) Pass
b) Line
c) Shift
d) None of the above

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Data Structures (BTN06405)

Day & Date: Thursday, 30-05-2024
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

Instructions: 1) All questions are compulsory.
 2) Figures to the right indicate full marks.

Section – I

Q.2 Solve any four of the following. **16**

- What is stack? Explain with neat diagram.
- Explain following terms in detail.
 Asymptotic Notations
 complexity analysis
- How to convert infix expression into postfix expression? Convert following infix expression into postfix.
 $(A+B)*(C-D)$
- Explain difference between static memory allocation and dynamic memory allocation.
- Explain queue with its operation. List out application of queue.

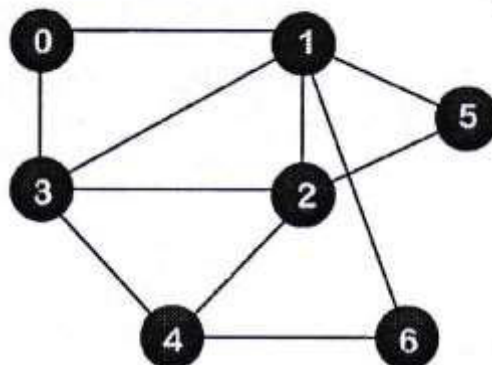
Q.3 Solve any two of the following. **12**

- Write a C code/program to implement binary search method.
- Write a Program to implement queue using array.
- Evaluate the following postfix expression using stack
 $4,5,4,2,\wedge,+,*,2,2,\wedge,9,3,/,*, -$

Section – II

Q.4 Solve any four of the following. **16**

- Differentiate between Singly linked list and Doubly linked list.
- Explain Circular Singly linked list with insertion.
- Explain AVL Tree.
- What is BFS and consider following graph for BFS traversal?



- Write a C program to implement the Selection sort method.

Q.5 Solve any two of the following.

a) Construct B-Tree of order 3.

84,17,82,78,81,45,42,2,11,34

b) What is Graph and explain basic Terminologies and representation?

c) What is Heap sort and Sort the list of numbers using Heap sort?

25,35,18,9,46,70

Seat No.	
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Set Q

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Data Structures (BTN06405)

Day & Date: Thursday, 30-05-2024
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MCQ/Objective Type Questions

Duration: 30 Minutes

Marks: 14

Q.1 Choose the correct option from the following.

14

- 1) Linked list is considered as an example of _____ type of memory allocation.
 - a) Dynamic
 - b) Static
 - c) Compile time
 - d) None of the above
- 2) In linked list each node contain minimum of two fields. One field is data field to store the data second field is _____.
 - a) Pointer to character
 - b) Pointer to integer
 - c) Pointer to node
 - d) None of the above
- 3) Which of the following statement about binary tree is CORRECT?
 - a) Every binary tree is either complete or full
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 - c) Every full binary tree is also a complete binary tree
 - d) A binary tree cannot be both complete and full
- 4) If a node having two children is to be deleted from binary search tree, it is replaced by its _____.
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- 5) A graph is a collection of nodes, called _____ And line segments called arcs or _____ that connect pair of nodes.
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- 8) Queues serve major role in _____.
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b) ptr = (NODE*)malloc(NODE);
c) ptr = (NODE*)malloc(sizeof(NODE*));
d) ptr = (NODE)malloc(sizeof(NODE));
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c) front==max-1
d) both a)&b)
- 13) Infinite recursion leads to _____.
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c) Overflow of I/O cycle
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c) Placing an element at the rear end
d) None of the above

Seat No.	
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S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS & TELECOMMUNICATION ENGINEERING
Data Structures (BTN06405)

Day & Date: Thursday, 30-05-2024
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Max. Marks: 56

Instructions: 1) All questions are compulsory.
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Section – I

Q.2 Solve any four of the following. **16**

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- Explain following terms in detail.
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 complexity analysis
- How to convert infix expression into postfix expression? Convert following infix expression into postfix.
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- Explain difference between static memory allocation and dynamic memory allocation.
- Explain queue with its operation. List out application of queue.

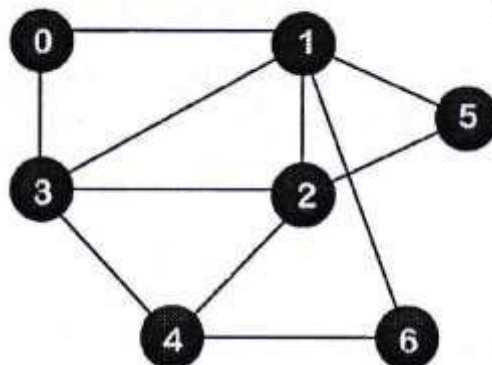
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- Write a Program to implement queue using array.
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 $4,5,4,2,\wedge,+,* ,2,2,\wedge,9,3,/,*,-$

Section – II

Q.4 Solve any four of the following. **16**

- Differentiate between Singly linked list and Doubly linked list.
- Explain Circular Singly linked list with insertion.
- Explain AVL Tree.
- What is BFS and consider following graph for BFS traversal?



- Write a C program to implement the Selection sort method.

Q.5 Solve any two of the following.

a) Construct B-Tree of order 3.

84,17,82,78,81,45,42,2,11,34

b) What is Graph and explain basic Terminologies and representation?

c) What is Heap sort and Sort the list of numbers using Heap sort?

25,35,18,9,46,70

Seat No.	
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Max. Marks: 70

Marks: 14

14

- Page 9 of 16

- 6) Consider the following definition in c programming language.
- ```

struct node
{
int data;
struct node * next;
}
type def struct node NODE;
NODE *ptr;

```
- Which of the following c code is used to create new node?
- ptr = (NODE\*)malloc(sizeof(NODE));
  - ptr = (NODE\*)malloc(NODE);
  - ptr = (NODE\*)malloc(sizeof(NODE\*));
  - ptr = (NODE)malloc(sizeof(NODE));
- 7) What would be the asymptotic time complexity to insert an element at the front of the linked list (head is known)?
- $O(1)$
  - $O(n)$
  - $O(n^2)$
  - $O(n^3)$
- 8) The Data structure used in standard implementation of Breadth First Search is \_\_\_\_.
- Stack
  - Queue
  - Linked list
  - None of the above
- 9) Overflow condition of queue is \_\_\_\_.
- rear==max-1
  - top==max-1
  - front==max-1
  - both a)&b)
- 10) Infinite recursion leads to \_\_\_\_.
- Overflow of run time stack
  - Under flow of register usage
  - Overflow of I/O cycle
  - Underflow of runtime stack
- 11) Adding an element to the stack means \_\_\_\_.
- Placing an element at the front end
  - placing an element at the top
  - Placing an element at the rear end
  - None of the above
- 12) Linked list is considered as an example of \_\_\_\_ type of memory allocation.
- Dynamic
  - Static
  - Compile time
  - None of the above
- 13) In linked list each node contain minimum of two fields. One field is data field to store the data second field is \_\_\_\_.
- Pointer to character
  - Pointer to integer
  - Pointer to node
  - None of the above
- 14) Which of the following statement about binary tree is CORRECT?
- Every binary tree is either complete or full
  - Every complete binary tree is also a full binary tree
  - Every full binary tree is also a complete binary tree
  - A binary tree cannot be both complete and full

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Data Structures (BTN06405)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Solve any four of the following.**

**16**

- What is stack? Explain with neat diagram.
- Explain following terms in detail.  
Asymptotic Notations  
complexity analysis
- How to convert infix expression into postfix expression? Convert following infix expression into postfix.  
 $(A+B)*(C-D)$
- Explain difference between static memory allocation and dynamic memory allocation.
- Explain queue with its operation. List out application of queue.

**Q.3 Solve any two of the following.**

**12**

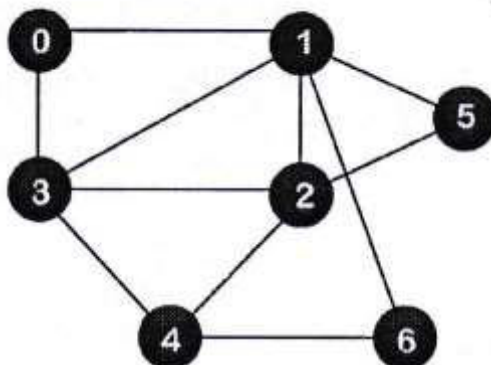
- Write a C code/program to implement binary search method.
- Write a Program to implement queue using array.
- Evaluate the following postfix expression using stack  
 $4,5,4,2,\wedge,+,*,2,2,\wedge,9,3,/,*, -$

**Section – II**

**Q.4 Solve any four of the following.**

**16**

- Differentiate between Singly linked list and Doubly linked list.
- Explain Circular Singly linked list with insertion.
- Explain AVL Tree.
- What is BFS and consider following graph for BFS traversal?



- Write a C program to implement the Selection sort method.

**Q.5 Solve any two of the following.**

**a)** Construct B-Tree of order 3.

84,17,82,78,81,45,42,2,11,34

**b)** What is Graph and explain basic Terminologies and representation?

**c)** What is Heap sort and Sort the list of numbers using Heap sort?

25,35,18,9,46,70

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Data Structures (BTN06405)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
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**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) Infinite recursion leads to \_\_\_\_\_.  
 a) Overflow of run time stack  
 b) Under flow of register usage  
 c) Overflow of I/O cycle  
 d) Underflow of runtime stack
- 2) Adding an element to the stack means \_\_\_\_\_.  
 a) Placing an element at the front end  
 b) placing an element at the top  
 c) Placing an element at the rear end  
 d) None of the above
- 3) Linked list is considered as an example of \_\_\_\_\_ type of memory allocation.  
 a) Dynamic  
 b) Static  
 c) Compile time  
 d) None of the above
- 4) In linked list each node contain minimum of two fields. One field is data field to store the data second field is \_\_\_\_\_.  
 a) Pointer to character  
 b) Pointer to integer  
 c) Pointer to node  
 d) None of the above
- 5) Which of the following statement about binary tree is CORRECT?  
 a) Every binary tree is either complete or full  
 b) Every complete binary tree is also a full binary tree  
 c) Every full binary tree is also a complete binary tree  
 d) A binary tree cannot be both complete and full
- 6) If a node having two children is to be deleted from binary search tree, it is replaced by its \_\_\_\_\_.  
 a) In-order predecessor  
 b) In-order successor  
 c) both a) & b  
 d) None
- 7) A graph is a collection of nodes, called \_\_\_\_\_. And line segments called arcs or \_\_\_\_\_ that connect pair of nodes.  
 a) vertices, edges  
 b) edges, vertices  
 c) vertices, paths  
 d) graph node, edges

- 8) What is the worst and average case time complexity in the binary search tree?
  - a)  $O(n^2)$
  - b)  $O(n)$
  - c)  $O(1)$
  - d)  $O(\log n)$
- 9) In Bubble sort Single Run of comparing data items in an array is known as \_\_\_\_\_.
  - a) Pass
  - b) Line
  - c) Shift
  - d) None of the above
- 10) Queues serve major role in \_\_\_\_\_.
  - a) Simulation of recursion
  - b) Simulation of arbitrary linked list
  - c) Simulation of limited resource allocation
  - d) Simulation of heap sort
- 11) Consider the following definition in c programming language.

```
struct node
{
int data;
struct node * next;
}
type def struct node NODE;
NODE *ptr;
```

Which of the following c code is used to create new node?
  - a) `ptr = (NODE*)malloc(sizeof(NODE));`
  - b) `ptr = (NODE*)malloc(NODE);`
  - c) `ptr = (NODE*)malloc(sizeof(NODE*));`
  - d) `ptr = (NODE)malloc(sizeof(NODE));`
- 12) What would be the asymptotic time complexity to insert an element at the front of the linked list (head is known)?
  - a)  $O(1)$
  - b)  $O(n)$
  - c)  $O(n^2)$
  - d)  $O(n^3)$
- 13) The Data structure used in standard implementation of Breadth First Search is \_\_\_\_\_.
  - a) Stack
  - b) Queue
  - c) Linked list
  - d) None of the above
- 14) Overflow condition of queue is \_\_\_\_\_.
  - a) `rear==max-1`
  - b) `top==max-1`
  - c) `front==max-1`
  - d) both a)&b)

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Data Structures (BTN06405)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
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**Section – I**

**Q.2 Solve any four of the following.** **16**

- What is stack? Explain with neat diagram.
- Explain following terms in detail.  
 Asymptotic Notations  
 complexity analysis
- How to convert infix expression into postfix expression? Convert following infix expression into postfix.  
 $(A+B)*(C-D)$
- Explain difference between static memory allocation and dynamic memory allocation.
- Explain queue with its operation. List out application of queue.

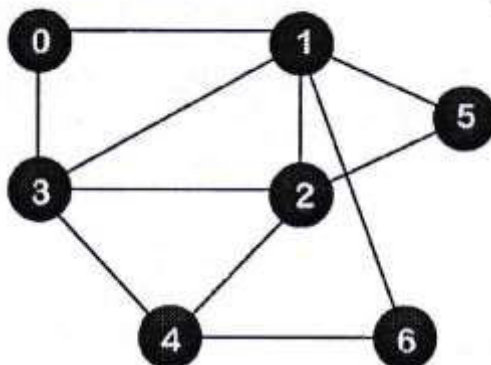
**Q.3 Solve any two of the following.** **12**

- Write a C code/program to implement binary search method.
- Write a Program to implement queue using array.
- Evaluate the following postfix expression using stack  
 $4,5,4,2,\wedge,+,*,2,2,\wedge,9,3,/,*, -$

**Section – II**

**Q.4 Solve any four of the following.** **16**

- Differentiate between Singly linked list and Doubly linked list.
- Explain Circular Singly linked list with insertion.
- Explain AVL Tree.
- What is BFS and consider following graph for BFS traversal?



- Write a C program to implement the Selection sort method.

**Q.5 Solve any two of the following.**

**a)** Construct B-Tree of order 3.

84,17,82,78,81,45,42,2,11,34

**b)** What is Graph and explain basic Terminologies and representation?

**c)** What is Heap sort and Sort the list of numbers using Heap sort?

25,35,18,9,46,70

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) Rank of a  $(m \times n)$  matrix is determined by the number of linearly \_\_\_\_\_ rows present in the matrix.
 

|              |                |
|--------------|----------------|
| a) Dependent | b) Independent |
| c) Both      | d) None        |
- 2) What is the probability of getting a number less than 1 on dice?
 

|          |          |
|----------|----------|
| a) 1     | b) $1/3$ |
| c) $1/2$ | d) 0     |
- 3) In square matrix, sum of diagonal elements is given as \_\_\_\_\_.
 

|                |         |
|----------------|---------|
| a) trace       | b) rank |
| c) Eigen Value | d) None |
- 4) A die is thrown once. What is the probability that the score is a factor of 6?
 

|          |          |
|----------|----------|
| a) $1/6$ | b) $1/2$ |
| c) $2/3$ | d) 1     |
- 5) The matrix which follows the conditions  $m=n$  is called?
 

|                  |                       |
|------------------|-----------------------|
| a) Square matrix | b) Rectangular matrix |
| c) Scalar matrix | d) Diagonal matrix    |
- 6) \_\_\_\_\_ shows difference between actual  $Y$  and predicted  $Y$  value found using regression equation.
 

|            |             |
|------------|-------------|
| a) slope   | b) residual |
| c) outlier | d) None     |
- 7) How many outcomes are possible when drawing a card from deck of cards?
 

|       |       |
|-------|-------|
| a) 1  | b) 13 |
| c) 52 | d) 26 |
- 8) PCA reduce dimensionality of the data using feature extraction.
 

|         |          |
|---------|----------|
| a) True | b) False |
|---------|----------|



- 9) What is Machine learning?
- a) The autonomous acquisition of knowledge through the use of computer programs
  - b) The autonomous acquisition of knowledge through the use of manual programs
  - c) The selective acquisition of knowledge through the use of computer programs
  - d) The selective acquisition of knowledge through the use of manual programs
- 10) In the regression equation  $Y = 21 - 3X$ , the slope is \_\_\_\_.
- a) 21
  - b) -3
  - c) -21
  - d) indeterminable
- 11) Identify the type of learning in which labelled training data is used.
- a) Semi supervised
  - b) Supervised learning
  - c) Reinforcement learning
  - d) Unsupervised learning
- 12) Which of the following are common classes of problems in machine learning?
- a) Regression
  - b) Classification
  - c) Clustering
  - d) All of above
- 13) For orthogonal variable, correlation value is \_\_\_\_.
- a) 0
  - b) 1
  - c) -1
  - d) None
- 14) What will happen when eigenvalues are roughly equal?
- a) PCA will perform outstandingly
  - b) PCA will perform badly
  - c) Can't Say
  - d) None of above

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Solve any four questions. 16**

- A die is rolled twice and two numbers are obtained, let  $X$  be the outcome of first role and  $Y$  be the outcome of the second roll. Given that  $X + Y = 5$ , what is the probability of  $X = 4$  or  $Y = 4$ ?
- Describe problem formulation.
- Solve following using Substitute method.  
 $2x - 3y = -2$                        $4x + y = 24$
- A fair coin is tossed three times. What is probability of obtaining one Head and two Tails?
- Write short note on linear regression model.

**Q.3 Solve any two questions. 12**

- Explain Conditional Probability and Product Rule.
- The trace of square matrix of order  $2 \times 2$  is 3 and trace of  $A^3$  is  $-18$ . Find determinant of matrix  $A$ .
- Consider two bags, an orange bag and black bag. There are 4 candies in orange bag and 5 candies in black bag. There are also 2 chocolates in orange bag and 3 chocolates in black bag. A sweet is to be chosen randomly from any of the bags. What is probability that chosen sweet is candy from black bag?

**Section – II**

**Q.4 Solve any four questions. 16**

- Explain common term related to PCA.
- Explain curse of dimensionality.
- Write a note on machine learning.
- Differentiate between Supervised, Unsupervised and Reinforcement Learning.
- Differentiate between Training data and Testing data.

**Q.5 Solve any two questions. 12**

- Explain Machine Learning Life cycle.
- Explain key steps of PCA in Practice.
- Explain various issues in machine learning.

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Computational Statistics (BTN04407)**

Max. Marks: 70

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
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- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

## Marks: 14

14

- Page 4 of 12

- 8) Rank of a ( $m \times n$ ) matrix is determined by the number of linearly \_\_\_\_\_ rows present in the matrix.

|              |                |
|--------------|----------------|
| a) Dependent | b) Independent |
| c) Both      | d) None        |
- 9) What is the probability of getting a number less than 1 on dice?

|                  |                  |
|------------------|------------------|
| a) 1             | b) $\frac{1}{3}$ |
| c) $\frac{1}{2}$ | d) 0             |
- 10) In square matrix, sum of diagonal elements is given as \_\_\_\_\_.

|                |         |
|----------------|---------|
| a) trace       | b) rank |
| c) Eigen Value | d) None |
- 11) A die is thrown once. What is the probability that the score is a factor of 6?

|                  |                  |
|------------------|------------------|
| a) $\frac{1}{6}$ | b) $\frac{1}{2}$ |
| c) $\frac{2}{3}$ | d) 1             |
- 12) The matrix which follows the conditions  $m=n$  is called?

|                  |                       |
|------------------|-----------------------|
| a) Square matrix | b) Rectangular matrix |
| c) Scalar matrix | d) Diagonal matrix    |
- 13) \_\_\_\_\_ shows difference between actual  $Y$  and predicted  $Y$  value found using regression equation.

|            |             |
|------------|-------------|
| a) slope   | b) residual |
| c) outlier | d) None     |
- 14) How many outcomes are possible when drawing a card from deck of cards?

|       |       |
|-------|-------|
| a) 1  | b) 13 |
| c) 52 | d) 26 |

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
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**Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
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**Section – I**

**Q.2 Solve any four questions.** **16**

- a) A die is rolled twice and two numbers are obtained, let  $X$  be the outcome of first role and  $Y$  be the outcome of the second roll. Given that  $X + Y = 5$ , what is the probability of  $X = 4$  or  $Y = 4$ ?
- b) Describe problem formulation.
- c) Solve following using Substitute method.  
 $2x - 3y = -2$                        $4x + y = 24$
- d) A fair coin is tossed three times. What is probability of obtaining one Head and two Tails?
- e) Write short note on linear regression model.

**Q.3 Solve any two questions.** **12**

- a) Explain Conditional Probability and Product Rule.
- b) The trace of square matrix of order  $2 \times 2$  is 3 and trace of  $A^3$  is  $-18$ . Find determinant of matrix  $A$ .
- c) Consider two bags, an orange bag and black bag. There are 4 candies in orange bag and 5 candies in black bag. There are also 2 chocolates in orange bag and 3 chocolates in black bag. A sweet is to be chosen randomly from any of the bags. What is probability that chosen sweet is candy from black bag?

**Section – II**

**Q.4 Solve any four questions.** **16**

- a) Explain common term related to PCA.
- b) Explain curse of dimensionality.
- c) Write a note on machine learning.
- d) Differentiate between Supervised, Unsupervised and Reinforcement Learning.
- e) Differentiate between Training data and Testing data.

**Q.5 Solve any two questions.** **12**

- a) Explain Machine Learning Life cycle.
- b) Explain key steps of PCA in Practice.
- c) Explain various issues in machine learning.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
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 4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) Identify the type of learning in which labelled training data is used.
 

|                           |                          |
|---------------------------|--------------------------|
| a) Semi supervised        | b) Supervised learning   |
| c) Reinforcement learning | d) Unsupervised learning |
- 2) Which of the following are common classes of problems in machine learning?
 

|               |                   |
|---------------|-------------------|
| a) Regression | b) Classification |
| c) Clustering | d) All of above   |
- 3) For orthogonal variable, correlation value is \_\_\_\_\_.
 

|       |         |
|-------|---------|
| a) 0  | b) 1    |
| c) -1 | d) None |
- 4) What will happen when eigenvalues are roughly equal?
 

|                                   |
|-----------------------------------|
| a) PCA will perform outstandingly |
| b) PCA will perform badly         |
| c) Can't Say                      |
| d) None of above                  |
- 5) Rank of a (m x n) matrix is determined by the number of linearly \_\_\_\_\_ rows present in the matrix.
 

|              |                |
|--------------|----------------|
| a) Dependent | b) Independent |
| c) Both      | d) None        |
- 6) What is the probability of getting a number less than 1 on dice?
 

|        |        |
|--------|--------|
| a) 1   | b) 1/3 |
| c) 1/2 | d) 0   |
- 7) In square matrix, sum of diagonal elements is given as \_\_\_\_\_.
 

|                |         |
|----------------|---------|
| a) trace       | b) rank |
| c) Eigen Value | d) None |
- 8) A die is thrown once. What is the probability that the score is a factor of 6?
 

|        |        |
|--------|--------|
| a) 1/6 | b) 1/2 |
| c) 2/3 | d) 1   |

- 9) The matrix which follows the conditions  $m=n$  is called?
  - a) Square matrix
  - b) Rectangular matrix
  - c) Scalar matrix
  - d) Diagonal matrix
- 10) \_\_\_\_\_ shows difference between actual  $Y$  and predicted  $Y$  value found using regression equation.
  - a) slope
  - b) residual
  - c) outlier
  - d) None
- 11) How many outcomes are possible when drawing a card from deck of cards?
  - a) 1
  - b) 13
  - c) 52
  - d) 26
- 12) PCA reduce dimensionality of the data using feature extraction.
  - a) True
  - b) False
- 13) What is Machine learning?
  - a) The autonomous acquisition of knowledge through the use of computer programs
  - b) The autonomous acquisition of knowledge through the use of manual programs
  - c) The selective acquisition of knowledge through the use of computer programs
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- 14) In the regression equation  $Y = 21 - 3X$ , the slope is \_\_\_\_\_.
  - a) 21
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  - d) indeterminable

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| Seat No. |  |
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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

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**Section – I**

**Q.2 Solve any four questions. 16**

- A die is rolled twice and two numbers are obtained, let  $X$  be the outcome of first role and  $Y$  be the outcome of the second roll. Given that  $X + Y = 5$ , what is the probability of  $X = 4$  or  $Y = 4$ ?
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**Q.3 Solve any two questions. 12**

- Explain Conditional Probability and Product Rule.
- The trace of square matrix of order  $2 \times 2$  is 3 and trace of  $A^3$  is  $-18$ . Find determinant of matrix  $A$ .
- Consider two bags, an orange bag and black bag. There are 4 candies in orange bag and 5 candies in black bag. There are also 2 chocolates in orange bag and 3 chocolates in black bag. A sweet is to be chosen randomly from any of the bags. What is probability that chosen sweet is candy from black bag?

**Section – II**

**Q.4 Solve any four questions. 16**

- Explain common term related to PCA.
- Explain curse of dimensionality.
- Write a note on machine learning.
- Differentiate between Supervised, Unsupervised and Reinforcement Learning.
- Differentiate between Training data and Testing data.

**Q.5 Solve any two questions. 12**

- Explain Machine Learning Life cycle.
- Explain key steps of PCA in Practice.
- Explain various issues in machine learning.



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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
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**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) \_\_\_\_\_ shows difference between actual  $Y$  and predicted  $Y$  value found using regression equation.
  - a) slope
  - b) residual
  - c) outlier
  - d) None
- 2) How many outcomes are possible when drawing a card from deck of cards?
  - a) 1
  - b) 13
  - c) 52
  - d) 26
- 3) PCA reduce dimensionality of the data using feature extraction.
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- 4) What is Machine learning?
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  - b) The autonomous acquisition of knowledge through the use of manual programs
  - c) The selective acquisition of knowledge through the use of computer programs
  - d) The selective acquisition of knowledge through the use of manual programs
- 5) In the regression equation  $Y = 21 - 3X$ , the slope is \_\_\_\_\_.
  - a) 21
  - b) -3
  - c) -21
  - d) indeterminable
- 6) Identify the type of learning in which labelled training data is used.
  - a) Semi supervised
  - b) Supervised learning
  - c) Reinforcement learning
  - d) Unsupervised learning
- 7) Which of the following are common classes of problems in machine learning?
  - a) Regression
  - b) Classification
  - c) Clustering
  - d) All of above
- 8) For orthogonal variable, correlation value is \_\_\_\_\_.
  - a) 0
  - b) 1
  - c) -1
  - d) None

- 9) What will happen when eigenvalues are roughly equal?
- a) PCA will perform outstandingly
  - b) PCA will perform badly
  - c) Can't Say
  - d) None of above
- 10) Rank of a (m x n) matrix is determined by the number of linearly \_\_\_\_\_ rows present in the matrix.
- a) Dependent
  - b) Independent
  - c) Both
  - d) None
- 11) What is the probability of getting a number less than 1 on dice?
- a) 1
  - b) 1/3
  - c) 1/2
  - d) 0
- 12) In square matrix, sum of diagonal elements is given as \_\_\_\_\_.
- a) trace
  - b) rank
  - c) Eigen Value
  - d) None
- 13) A die is thrown once. What is the probability that the score is a factor of 6?
- a) 1/6
  - b) 1/2
  - c) 2/3
  - d) 1
- 14) The matrix which follows the conditions  $m=n$  is called?
- a) Square matrix
  - b) Rectangular matrix
  - c) Scalar matrix
  - d) Diagonal matrix

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Set **S**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Computational Statistics (BTN04407)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I****Q.2 Solve any four questions. 16**

- A die is rolled twice and two numbers are obtained, let  $X$  be the outcome of first role and  $Y$  be the outcome of the second roll. Given that  $X + Y = 5$ , what is the probability of  $X = 4$  or  $Y = 4$ ?
- Describe problem formulation.
- Solve following using Substitute method.  
 $2x - 3y = -2$                        $4x + y = 24$
- A fair coin is tossed three times. What is probability of obtaining one Head and two Tails?
- Write short note on linear regression model.

**Q.3 Solve any two questions. 12**

- Explain Conditional Probability and Product Rule.
- The trace of square matrix of order  $2 \times 2$  is 3 and trace of  $A^3$  is  $-18$ . Find determinant of matrix  $A$ .
- Consider two bags, an orange bag and black bag. There are 4 candies in orange bag and 5 candies in black bag. There are also 2 chocolates in orange bag and 3 chocolates in black bag. A sweet is to be chosen randomly from any of the bags. What is probability that chosen sweet is candy from black bag?

**Section – II****Q.4 Solve any four questions. 16**

- Explain common term related to PCA.
- Explain curse of dimensionality.
- Write a note on machine learning.
- Differentiate between Supervised, Unsupervised and Reinforcement Learning.
- Differentiate between Training data and Testing data.

**Q.5 Solve any two questions. 12**

- Explain Machine Learning Life cycle.
- Explain key steps of PCA in Practice.
- Explain various issues in machine learning.

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Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

## Marks: 14

- 1) What data base function allows you to define the data your database is storing?
  - a) Definition wizard
  - b) Query Function
  - c) Design view
  - d) Data dictionary
- 2) What key links records from one database table to a record or records in another database table?
  - a) Primary key
  - b) Principal key
  - c) Foreign key
  - d) Link key
- 3) Which of the following contains information about the structure of a database?
  - a) Database management system
  - b) Data dictionary
  - c) Data repository
  - d) Data warehouse
- 4) Relational calculus is a \_\_\_\_\_.
  - a) Procedural language
  - b) Non- Procedural language
  - c) Data definition language
  - d) High level language
- 5) Conceptual design \_\_\_\_\_.
  - a) is a documentation technique.
  - b) needs data volume and processing frequencies to determine the size of the database.
  - c) involves modelling independent of the DBMS.
  - d) is designing the relational model.
- 6) E-R model uses this symbol to represent weak entity set?
  - a) Dotted rectangle
  - b) Diamond
  - c) Doubly outlined rectangle
  - d) None of these
- 7) In a relation \_\_\_\_\_.
  - a) Ordering of rows is immaterial
  - b) No two rows are identical
  - c) (A) and (B) both are true
  - d) None of these

- 8) The method in which records are physically stored in a specified order according to a key field in each record is \_\_\_\_\_.
  - a) hash.
  - b) direct.
  - c) sequential.
  - d) all of the above
- 9) A DBMS query language is designed to \_\_\_\_\_.
  - a) support end users who use English-like commands.
  - b) support in the development of complex applications software.
  - c) specify the structure of a database
  - d) all of the above
- 10) The file organization that provides very fast access to any arbitrary record of a file is \_\_\_\_\_.
  - a) Ordered file
  - b) Unordered file
  - c) Hashed file
  - d) B-tree
- 11) Which of the following database object does not physically exist?
  - a) base table
  - b) index
  - c) view
  - d) none of the above
- 12) A lack of normalization can lead to which one of the following problems:
  - a) Lost Updates
  - b) Insertion problems
  - c) Deferred updates
  - d) Deletion of data
- 13) Given the following relation vendor order (vendor no, order no, vendor name, qty supplied, price/unit) it is not in 2 NF because \_\_\_\_\_.
  - a) it is not in 1 NF
  - b) it has a composite key
  - c) non-key attribute vendor name is dependent on vendor no. which is one part of the composite key
  - d) Qty supplied and price/unit are dependent
- 14) In order to undo the work of transaction after last commit which one should be used?
  - a) View
  - b) Commit
  - c) Rollback
  - d) Flashback

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Set **P**

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Database Management Systems (BTN04408)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four questions. 16**

- What is DBMS? And explain the purpose of database system?
- What are the different design issues in ER model?
- Explain with proper example following Relational algebra Operations:
  - Select
  - Project
  - Union
  - Set- Difference
- Explain view in SQL with example.
- Explain different applications of Database system.

**Q.3 Attempt any two questions. 12**

- Explain the basic structure of SQL queries. Also give examples.
- Explain Domain relational Calculus & Tuple relational Calculus with example.
- Explain Extended Relational Algebra operation with example.

**Section - II**

**Q.4 Attempt any four questions. 16**

- Explain different Set operations in SQL.
- What is multivalued dependency? Give example.
- Explain in detail B<sup>+</sup> tree file organization with an example.
- Explain the transaction states with neat diagram.
- Explain transaction model with example.

**Q.5 Attempt any two questions. 12**

- Explain different string operations in SQL with example.
- List the ACID properties and explain each property in detail with a suitable example.
- Explain the distinction between closed and open hashing. Discuss merits of both techniques in database applications.

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Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

## Marks: 14

## 14

- Page 4 of 12

- 8) What data base function allows you to define the data your database is storing?
- a) Definition wizard
  - b) Query Function
  - c) Design view
  - d) Data dictionary
- 9) What key links records from one database table to a record or records in another database table?
- a) Primary key
  - b) Principal key
  - c) Foreign key
  - d) Link key
- 10) Which of the following contains information about the structure of a database?
- a) Database management system
  - b) Data dictionary
  - c) Data repository
  - d) Data warehouse
- 11) Relational calculus is a \_\_\_\_\_.
- a) Procedural language
  - b) Non- Procedural language
  - c) Data definition language
  - d) High level language
- 12) Conceptual design \_\_\_\_\_.
- a) is a documentation technique.
  - b) needs data volume and processing frequencies to determine the size of the database.
  - c) involves modelling independent of the DBMS.
  - d) is designing the relational model.
- 13) E-R model uses this symbol to represent weak entity set?
- a) Dotted rectangle
  - b) Diamond
  - c) Doubly outlined rectangle
  - d) None of these
- 14) In a relation \_\_\_\_\_.
- a) Ordering of rows is immaterial
  - b) No two rows are identical
  - c) (A) and (B) both are true
  - d) None of these



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Set **Q**

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Database Management Systems (BTN04408)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four questions. 16**

- What is DBMS? And explain the purpose of database system?
- What are the different design issues in ER model?
- Explain with proper example following Relational algebra Operations:
  - Select
  - Project
  - Union
  - Set- Difference
- Explain view in SQL with example.
- Explain different applications of Database system.

**Q.3 Attempt any two questions. 12**

- Explain the basic structure of SQL queries. Also give examples.
- Explain Domain relational Calculus & Tuple relational Calculus with example.
- Explain Extended Relational Algebra operation with example.

**Section - II**

**Q.4 Attempt any four questions. 16**

- Explain different Set operations in SQL.
- What is multivalued dependency? Give example.
- Explain in detail B<sup>+</sup> tree file organization with an example.
- Explain the transaction states with neat diagram.
- Explain transaction model with example.

**Q.5 Attempt any two questions. 12**

- Explain different string operations in SQL with example.
- List the ACID properties and explain each property in detail with a suitable example.
- Explain the distinction between closed and open hashing. Discuss merits of both techniques in database applications.

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Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

## Marks: 14

## 14

- Page 7 of 12

- 9) Conceptual design \_\_\_\_\_.
  - a) is a documentation technique.
  - b) needs data volume and processing frequencies to determine the size of the database.
  - c) involves modelling independent of the DBMS.
  - d) is designing the relational model.
- 10) E-R model uses this symbol to represent weak entity set?
  - a) Dotted rectangle
  - b) Diamond
  - c) Doubly outlined rectangle
  - d) None of these
- 11) In a relation \_\_\_\_\_.
  - a) Ordering of rows is immaterial
  - b) No two rows are identical
  - c) (A) and (B) both are true
  - d) None of these
- 12) The method in which records are physically stored in a specified order according to a key field in each record is \_\_\_\_\_.
  - a) hash.
  - b) direct.
  - c) sequential.
  - d) all of the above
- 13) A DBMS query language is designed to \_\_\_\_\_.
  - a) support end users who use English-like commands.
  - b) support in the development of complex applications software.
  - c) specify the structure of a database
  - d) all of the above
- 14) The file organization that provides very fast access to any arbitrary record of a file is \_\_\_\_\_.
  - a) Ordered file
  - b) Unordered file
  - c) Hashed file
  - d) B-tree

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**Set R**

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Database Management Systems (BTN04408)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four questions. 16**

- What is DBMS? And explain the purpose of database system?
- What are the different design issues in ER model?
- Explain with proper example following Relational algebra Operations:
  - Select
  - Project
  - Union
  - Set- Difference
- Explain view in SQL with example.
- Explain different applications of Database system.

**Q.3 Attempt any two questions. 12**

- Explain the basic structure of SQL queries. Also give examples.
- Explain Domain relational Calculus & Tuple relational Calculus with example.
- Explain Extended Relational Algebra operation with example.

**Section - II**

**Q.4 Attempt any four questions. 16**

- Explain different Set operations in SQL.
- What is multivalued dependency? Give example.
- Explain in detail B<sup>+</sup> tree file organization with an example.
- Explain the transaction states with neat diagram.
- Explain transaction model with example.

**Q.5 Attempt any two questions. 12**

- Explain different string operations in SQL with example.
- List the ACID properties and explain each property in detail with a suitable example.
- Explain the distinction between closed and open hashing. Discuss merits of both techniques in database applications.

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**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Database Management Systems (BTN04408)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
3) Figures to the right indicates full marks.  
4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) E-R model uses this symbol to represent weak entity set?  
a) Dotted rectangle                      b) Diamond  
c) Doubly outlined rectangle              d) None of these
- 2) In a relation \_\_\_\_\_.  
a) Ordering of rows is immaterial  
b) No two rows are identical  
c) (A) and (B) both are true  
d) None of these
- 3) The method in which records are physically stored in a specified order according to a key field in each record is \_\_\_\_\_.  
a) hash.                                      b) direct.  
c) sequential.                                d) all of the above
- 4) A DBMS query language is designed to \_\_\_\_\_.  
a) support end users who use English-like commands.  
b) support in the development of complex applications software.  
c) specify the structure of a database  
d) all of the above
- 5) The file organization that provides very fast access to any arbitrary record of a file is \_\_\_\_\_.  
a) Ordered file                                b) Unordered file  
c) Hashed file                                d) B-tree
- 6) Which of the following database object does not physically exist?  
a) base table                                b) index  
c) view                                        d) none of the above
- 7) A lack of normalization can lead to which one of the following problems:  
a) Lost Updates                                b) Insertion problems  
c) Deferred updates                            d) Deletion of data

- 8) Given the following relation vendor order (vendor no, order no, vendor name, qty supplied, price/unit) it is not in 2 NF because \_\_\_\_\_.  
a) it is not in 1 NF  
b) it has a composite key  
c) non-key attribute vendor name is dependent on vendor no. which is one part of the composite key  
d) Qty supplied and price/unit are dependent
- 9) In order to undo the work of transaction after last commit which one should be used?  
a) View  
b) Commit  
c) Rollback  
d) Flashback
- 10) What data base function allows you to define the data your database is storing?  
a) Definition wizard  
b) Query Function  
c) Design view  
d) Data dictionary
- 11) What key links records from one database table to a record or records in another database table?  
a) Primary key  
b) Principal key  
c) Foreign key  
d) Link key
- 12) Which of the following contains information about the structure of a database?  
a) Database management system  
b) Data dictionary  
c) Data repository  
d) Data warehouse
- 13) Relational calculus is a \_\_\_\_\_.  
a) Procedural language  
b) Non- Procedural language  
c) Data definition language  
d) High level language
- 14) Conceptual design \_\_\_\_\_.  
a) is a documentation technique.  
b) needs data volume and processing frequencies to determine the size of the database.  
c) involves modelling independent of the DBMS.  
d) is designing the relational model.

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**Set S**

**S.Y. (B.Tech.) (Sem-II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Database Management Systems (BTN04408)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four questions. 16**

- a) What is DBMS? And explain the purpose of database system?
- b) What are the different design issues in ER model?
- c) Explain with proper example following Relational algebra Operations:
  - i) Select
  - ii) Project
  - iii) Union
  - iv) Set- Difference
- d) Explain view in SQL with example.
- e) Explain different applications of Database system.

**Q.3 Attempt any two questions. 12**

- a) Explain the basic structure of SQL queries. Also give examples.
- b) Explain Domain relational Calculus & Tuple relational Calculus with example.
- c) Explain Extended Relational Algebra operation with example.

**Section - II**

**Q.4 Attempt any four questions. 16**

- a) Explain different Set operations in SQL.
- b) What is multivalued dependency? Give example.
- c) Explain in detail B<sup>+</sup> tree file organization with an example.
- d) Explain the transaction states with neat diagram.
- e) Explain transaction model with example.

**Q.5 Attempt any two questions. 12**

- a) Explain different string operations in SQL with example.
- b) List the ACID properties and explain each property in detail with a suitable example.
- c) Explain the distinction between closed and open hashing. Discuss merits of both techniques in database applications.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.  
2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

**14**

- 1) What is the primary purpose of the Internet of Things (IoT)?
  - a) Entertainment
  - b) Interconnecting physical devices
  - c) Social networking
  - d) Online shopping
- 2) Which component of an IoT system is responsible for real-time processing on the device?
  - a) Embedded system
  - b) Cloud
  - c) Communication system
  - d) Applications
- 3) What is the main purpose of an integrated development environment (IDE) in embedded development?
  - a) Managing cloud infrastructure
  - b) Enabling communication between devices
  - c) Simplifying the development process
  - d) Storing data in the cloud
- 4) Which component of an embedded system is responsible for data storage and processing?
  - a) Cloud
  - b) Input/Output interfaces
  - c) Communication system
  - d) Applications
- 5) What is the significance of using Linux in embedded systems for IoT?
  - a) Linux enhances real-time processing.
  - b) Linux is the only operating system compatible with embedded systems.
  - c) Linux simplifies the development process.
  - d) Linux is not suitable for embedded systems.
- 6) What is the primary function of sensors in the context of IoT?
  - a) Providing cloud storage
  - b) Interconnecting devices
  - c) Collecting data from the environment
  - d) Performing real-time processing



- 7) Which of the following is NOT a type of sensor?
- a) Accelerometer
  - b) Light detector
  - c) Communication system
  - d) Humidity sensor
- 8) What is the significance of humidity sensors in IoT applications?
- a) Monitoring social media activity
  - b) Improving communication systems
  - c) Enabling energy efficiency in buildings
  - d) Enhancing online shopping experiences
- 9) What is the primary function of occupancy and motion detectors in IoT applications?
- a) Monitoring temperature
  - b) Detecting human presence and movement
  - c) Measuring humidity levels
  - d) Tracking asset positions
- 10) Which sensor is commonly used for measuring temperature in IoT applications?
- a) Light detector
  - b) Acceleration sensor
  - c) Humidity sensor
  - d) Temperature sensor
- 11) Which communication technology is commonly used for long-range communication in IoT devices?
- a) Bluetooth Low Energy (BLE)
  - b) RFID
  - c) WiFi
  - d) Zigbee
- 12) What is the primary advantage of using Zigbee in IoT applications?
- a) High data transfer speed
  - b) Low power consumption
  - c) Long communication range
  - d) Large coverage area
- 13) What is the primary function of Raspberry Pi in IoT development?
- a) Data storage
  - b) Data processing
  - c) Network routing
  - d) Sensor calibration
- 14) Which operating system is commonly used with Raspberry Pi for IoT applications?
- a) Windows 10
  - b) Ubuntu
  - c) Raspbian
  - d) macOS

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**Set****P**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt Any Four.**

**16**

- a) Define the Internet of Things and explain its significance in today's technological landscape.
- b) Discuss the role of embedded systems in IoT with examples.
- c) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- d) Describe the components of an embedded system and explain the functions of the processor, memory, and input/output interfaces in an embedded system.
- e) Discuss how sensors contribute to collecting data for various applications.

**Q.3 Attempt Any Two.**

**12**

- a) Identify and discuss the challenges and security considerations associated with the implementation of IoT in various domains. How can these challenges be addressed to ensure the integrity and privacy of IoT systems?
- b) Explain the significance of integrated development environments (IDEs) in embedded development. Discuss different IDEs used for embedded systems and their features, emphasizing their role in simplifying the development process.
- c) Discuss the fundamentals of signals and systems in the context of sensors. Explain how signals are generated and processed in sensor applications, and highlight the importance of signal conditioning.

**Section – II s**

**Q.4 Attempt Any Four.**

**16**

- a) Discuss the applications of occupancy and motion detectors in IoT with examples.
- b) Explain the various applications in agriculture where the sensors play a crucial role in IoT.
- c) Discuss how light sensors are used for tasks such as ambient light adjustment, security, and in consumer electronics.
- d) Explain the basics of Bluetooth Low Energy (BLE) technology. Discuss its architecture, characteristics, and applications in IoT.
- e) Explain the role and significance of Raspberry Pi in IoT solution development.

**Q.5 Attempt Any Two.**

- a)** Discuss the role of temperature sensors in various IoT applications. Discuss examples of temperature-sensitive applications in industries such as healthcare, food storage, and climate control.
- b)** Discuss the techniques and protocols used for interfacing LED, switches, and LCD with Raspberry Pi.
- c)** Examine the integration of communication technologies in industrial IoT applications. Discuss how BLE, WiFi, and RFID are employed to enable communication between machines and support automation in industrial settings.

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Set **Q**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day &amp; Date: Saturday, 01-06-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.  
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

**14**

- 1) What is the significance of humidity sensors in IoT applications?
  - a) Monitoring social media activity
  - b) Improving communication systems
  - c) Enabling energy efficiency in buildings
  - d) Enhancing online shopping experiences
- 2) What is the primary function of occupancy and motion detectors in IoT applications?
  - a) Monitoring temperature
  - b) Detecting human presence and movement
  - c) Measuring humidity levels
  - d) Tracking asset positions
- 3) Which sensor is commonly used for measuring temperature in IoT applications?
 

|                    |                        |
|--------------------|------------------------|
| a) Light detector  | b) Acceleration sensor |
| c) Humidity sensor | d) Temperature sensor  |
- 4) Which communication technology is commonly used for long-range communication in IoT devices?
 

|                               |           |
|-------------------------------|-----------|
| a) Bluetooth Low Energy (BLE) | b) RFID   |
| c) WiFi                       | d) Zigbee |
- 5) What is the primary advantage of using Zigbee in IoT applications?
 

|                             |                          |
|-----------------------------|--------------------------|
| a) High data transfer speed | b) Low power consumption |
| c) Long communication range | d) Large coverage area   |
- 6) What is the primary function of Raspberry Pi in IoT development?
 

|                    |                       |
|--------------------|-----------------------|
| a) Data storage    | b) Data processing    |
| c) Network routing | d) Sensor calibration |
- 7) Which operating system is commonly used with Raspberry Pi for IoT applications?
 

|               |           |
|---------------|-----------|
| a) Windows 10 | b) Ubuntu |
| c) Raspbian   | d) macOS  |

- 8) What is the primary purpose of the Internet of Things (IoT)?
- a) Entertainment
  - b) Interconnecting physical devices
  - c) Social networking
  - d) Online shopping
- 9) Which component of an IoT system is responsible for real-time processing on the device?
- a) Embedded system
  - b) Cloud
  - c) Communication system
  - d) Applications
- 10) What is the main purpose of an integrated development environment (IDE) in embedded development?
- a) Managing cloud infrastructure
  - b) Enabling communication between devices
  - c) Simplifying the development process
  - d) Storing data in the cloud
- 11) Which component of an embedded system is responsible for data storage and processing?
- a) Cloud
  - b) Input/Output interfaces
  - c) Communication system
  - d) Applications
- 12) What is the significance of using Linux in embedded systems for IoT?
- a) Linux enhances real-time processing.
  - b) Linux is the only operating system compatible with embedded systems.
  - c) Linux simplifies the development process.
  - d) Linux is not suitable for embedded systems.
- 13) What is the primary function of sensors in the context of IoT?
- a) Providing cloud storage
  - b) Interconnecting devices
  - c) Collecting data from the environment
  - d) Performing real-time processing
- 14) Which of the following is NOT a type of sensor?
- a) Accelerometer
  - b) Light detector
  - c) Communication system
  - d) Humidity sensor

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| <b>Set</b> | <b>Q</b> |
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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt Any Four.**

**16**

- a) Define the Internet of Things and explain its significance in today's technological landscape.
- b) Discuss the role of embedded systems in IoT with examples.
- c) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- d) Describe the components of an embedded system and explain the functions of the processor, memory, and input/output interfaces in an embedded system.
- e) Discuss how sensors contribute to collecting data for various applications.

**Q.3 Attempt Any Two.**

**12**

- a) Identify and discuss the challenges and security considerations associated with the implementation of IoT in various domains. How can these challenges be addressed to ensure the integrity and privacy of IoT systems?
- b) Explain the significance of integrated development environments (IDEs) in embedded development. Discuss different IDEs used for embedded systems and their features, emphasizing their role in simplifying the development process.
- c) Discuss the fundamentals of signals and systems in the context of sensors. Explain how signals are generated and processed in sensor applications, and highlight the importance of signal conditioning.

**Section – II s**

**Q.4 Attempt Any Four.**

**16**

- a) Discuss the applications of occupancy and motion detectors in IoT with examples.
- b) Explain the various applications in agriculture where the sensors play a crucial role in IoT.
- c) Discuss how light sensors are used for tasks such as ambient light adjustment, security, and in consumer electronics.
- d) Explain the basics of Bluetooth Low Energy (BLE) technology. Discuss its architecture, characteristics, and applications in IoT.
- e) Explain the role and significance of Raspberry Pi in IoT solution development.

**Q.5 Attempt Any Two.**

- a)** Discuss the role of temperature sensors in various IoT applications. Discuss examples of temperature-sensitive applications in industries such as healthcare, food storage, and climate control.
- b)** Discuss the techniques and protocols used for interfacing LED, switches, and LCD with Raspberry Pi.
- c)** Examine the integration of communication technologies in industrial IoT applications. Discuss how BLE, WiFi, and RFID are employed to enable communication between machines and support automation in industrial settings.

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Set **R**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day &amp; Date: Saturday, 01-06-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.  
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

**14**

- 1) Which communication technology is commonly used for long-range communication in IoT devices?
 

|                               |           |
|-------------------------------|-----------|
| a) Bluetooth Low Energy (BLE) | b) RFID   |
| c) WiFi                       | d) Zigbee |
- 2) What is the primary advantage of using Zigbee in IoT applications?
 

|                             |                          |
|-----------------------------|--------------------------|
| a) High data transfer speed | b) Low power consumption |
| c) Long communication range | d) Large coverage area   |
- 3) What is the primary function of Raspberry Pi in IoT development?
 

|                    |                       |
|--------------------|-----------------------|
| a) Data storage    | b) Data processing    |
| c) Network routing | d) Sensor calibration |
- 4) Which operating system is commonly used with Raspberry Pi for IoT applications?
 

|               |           |
|---------------|-----------|
| a) Windows 10 | b) Ubuntu |
| c) Raspbian   | d) macOS  |
- 5) What is the primary purpose of the Internet of Things (IoT)?
 

|                                     |
|-------------------------------------|
| a) Entertainment                    |
| b) Interconnecting physical devices |
| c) Social networking                |
| d) Online shopping                  |
- 6) Which component of an IoT system is responsible for real-time processing on the device?
 

|                         |                 |
|-------------------------|-----------------|
| a) Embedded system      | b) Cloud        |
| c) Communication system | d) Applications |
- 7) What is the main purpose of an integrated development environment (IDE) in embedded development?
 

|                                           |
|-------------------------------------------|
| a) Managing cloud infrastructure          |
| b) Enabling communication between devices |
| c) Simplifying the development process    |
| d) Storing data in the cloud              |



- 8) Which component of an embedded system is responsible for data storage and processing?
- a) Cloud
  - b) Input/Output interfaces
  - c) Communication system
  - d) Applications
- 9) What is the significance of using Linux in embedded systems for IoT?
- a) Linux enhances real-time processing.
  - b) Linux is the only operating system compatible with embedded systems.
  - c) Linux simplifies the development process.
  - d) Linux is not suitable for embedded systems.
- 10) What is the primary function of sensors in the context of IoT?
- a) Providing cloud storage
  - b) Interconnecting devices
  - c) Collecting data from the environment
  - d) Performing real-time processing
- 11) Which of the following is NOT a type of sensor?
- a) Accelerometer
  - b) Light detector
  - c) Communication system
  - d) Humidity sensor
- 12) What is the significance of humidity sensors in IoT applications?
- a) Monitoring social media activity
  - b) Improving communication systems
  - c) Enabling energy efficiency in buildings
  - d) Enhancing online shopping experiences
- 13) What is the primary function of occupancy and motion detectors in IoT applications?
- a) Monitoring temperature
  - b) Detecting human presence and movement
  - c) Measuring humidity levels
  - d) Tracking asset positions
- 14) Which sensor is commonly used for measuring temperature in IoT applications?
- a) Light detector
  - b) Acceleration sensor
  - c) Humidity sensor
  - d) Temperature sensor

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**Set R**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt Any Four.**

**16**

- a) Define the Internet of Things and explain its significance in today's technological landscape.
- b) Discuss the role of embedded systems in IoT with examples.
- c) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- d) Describe the components of an embedded system and explain the functions of the processor, memory, and input/output interfaces in an embedded system.
- e) Discuss how sensors contribute to collecting data for various applications.

**Q.3 Attempt Any Two.**

**12**

- a) Identify and discuss the challenges and security considerations associated with the implementation of IoT in various domains. How can these challenges be addressed to ensure the integrity and privacy of IoT systems?
- b) Explain the significance of integrated development environments (IDEs) in embedded development. Discuss different IDEs used for embedded systems and their features, emphasizing their role in simplifying the development process.
- c) Discuss the fundamentals of signals and systems in the context of sensors. Explain how signals are generated and processed in sensor applications, and highlight the importance of signal conditioning.

**Section – II s**

**Q.4 Attempt Any Four.**

**16**

- a) Discuss the applications of occupancy and motion detectors in IoT with examples.
- b) Explain the various applications in agriculture where the sensors play a crucial role in IoT.
- c) Discuss how light sensors are used for tasks such as ambient light adjustment, security, and in consumer electronics.
- d) Explain the basics of Bluetooth Low Energy (BLE) technology. Discuss its architecture, characteristics, and applications in IoT.
- e) Explain the role and significance of Raspberry Pi in IoT solution development.

**Q.5 Attempt Any Two.**

- a)** Discuss the role of temperature sensors in various IoT applications. Discuss examples of temperature-sensitive applications in industries such as healthcare, food storage, and climate control.
- b)** Discuss the techniques and protocols used for interfacing LED, switches, and LCD with Raspberry Pi.
- c)** Examine the integration of communication technologies in industrial IoT applications. Discuss how BLE, WiFi, and RFID are employed to enable communication between machines and support automation in industrial settings.

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Set **S**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day & Date: Saturday, 01-06-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.  
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

**14**

- 1) What is the primary function of sensors in the context of IoT?
  - a) Providing cloud storage
  - b) Interconnecting devices
  - c) Collecting data from the environment
  - d) Performing real-time processing
- 2) Which of the following is NOT a type of sensor?
  - a) Accelerometer
  - b) Light detector
  - c) Communication system
  - d) Humidity sensor
- 3) What is the significance of humidity sensors in IoT applications?
  - a) Monitoring social media activity
  - b) Improving communication systems
  - c) Enabling energy efficiency in buildings
  - d) Enhancing online shopping experiences
- 4) What is the primary function of occupancy and motion detectors in IoT applications?
  - a) Monitoring temperature
  - b) Detecting human presence and movement
  - c) Measuring humidity levels
  - d) Tracking asset positions
- 5) Which sensor is commonly used for measuring temperature in IoT applications?
  - a) Light detector
  - b) Acceleration sensor
  - c) Humidity sensor
  - d) Temperature sensor
- 6) Which communication technology is commonly used for long-range communication in IoT devices?
  - a) Bluetooth Low Energy (BLE)
  - b) RFID
  - c) WiFi
  - d) Zigbee
- 7) What is the primary advantage of using Zigbee in IoT applications?
  - a) High data transfer speed
  - b) Low power consumption
  - c) Long communication range
  - d) Large coverage area

- 8)** What is the primary function of Raspberry Pi in IoT development?
- a) Data storage
  - b) Data processing
  - c) Network routing
  - d) Sensor calibration
- 9)** Which operating system is commonly used with Raspberry Pi for IoT applications?
- a) Windows 10
  - b) Ubuntu
  - c) Raspbian
  - d) macOS
- 10)** What is the primary purpose of the Internet of Things (IoT)?
- a) Entertainment
  - b) Interconnecting physical devices
  - c) Social networking
  - d) Online shopping
- 11)** Which component of an IoT system is responsible for real-time processing on the device?
- a) Embedded system
  - b) Cloud
  - c) Communication system
  - d) Applications
- 12)** What is the main purpose of an integrated development environment (IDE) in embedded development?
- a) Managing cloud infrastructure
  - b) Enabling communication between devices
  - c) Simplifying the development process
  - d) Storing data in the cloud
- 13)** Which component of an embedded system is responsible for data storage and processing?
- a) Cloud
  - b) Input/Output interfaces
  - c) Communication system
  - d) Applications
- 14)** What is the significance of using Linux in embedded systems for IoT?
- a) Linux enhances real-time processing.
  - b) Linux is the only operating system compatible with embedded systems.
  - c) Linux simplifies the development process.
  - d) Linux is not suitable for embedded systems.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Fundamentals of IOT (BTN04409)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt Any Four.**

**16**

- a) Define the Internet of Things and explain its significance in today's technological landscape.
- b) Discuss the role of embedded systems in IoT with examples.
- c) Discuss the key characteristics that differentiate embedded systems from general-purpose computing systems.
- d) Describe the components of an embedded system and explain the functions of the processor, memory, and input/output interfaces in an embedded system.
- e) Discuss how sensors contribute to collecting data for various applications.

**Q.3 Attempt Any Two.**

**12**

- a) Identify and discuss the challenges and security considerations associated with the implementation of IoT in various domains. How can these challenges be addressed to ensure the integrity and privacy of IoT systems?
- b) Explain the significance of integrated development environments (IDEs) in embedded development. Discuss different IDEs used for embedded systems and their features, emphasizing their role in simplifying the development process.
- c) Discuss the fundamentals of signals and systems in the context of sensors. Explain how signals are generated and processed in sensor applications, and highlight the importance of signal conditioning.

**Section – II s**

**Q.4 Attempt Any Four.**

**16**

- a) Discuss the applications of occupancy and motion detectors in IoT with examples.
- b) Explain the various applications in agriculture where the sensors play a crucial role in IoT.
- c) Discuss how light sensors are used for tasks such as ambient light adjustment, security, and in consumer electronics.
- d) Explain the basics of Bluetooth Low Energy (BLE) technology. Discuss its architecture, characteristics, and applications in IoT.
- e) Explain the role and significance of Raspberry Pi in IoT solution development.

**Q.5 Attempt Any Two.**

- a)** Discuss the role of temperature sensors in various IoT applications. Discuss examples of temperature-sensitive applications in industries such as healthcare, food storage, and climate control.
- b)** Discuss the techniques and protocols used for interfacing LED, switches, and LCD with Raspberry Pi.
- c)** Examine the integration of communication technologies in industrial IoT applications. Discuss how BLE, WiFi, and RFID are employed to enable communication between machines and support automation in industrial settings.

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Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

### MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

14

- 1) A cryptosystem is also termed as \_\_\_\_\_.  
a) secure system                      b) cipher system  
c) cipher-text                         d) secure algorithm
- 2) \_\_\_\_\_ takes the plain text and the key as input for creating cipher-text.  
a) Decryption Algorithm              b) Hashing Algorithm  
c) Tuning Algorithm                  d) Encryption Algorithm
- 3) In \_\_\_\_\_ same keys are implemented for encrypting as well as decrypting the information.  
a) Symmetric Key Encryption        b) Asymmetric Key Encryption  
c) Asymmetric Key Decryption      d) Hash-based Key Encryption
- 4) Use Caesar's Cipher to decipher the following  
HQFUBSWHG WHAW  
a) ABANDONED LOCK                  b) ENCRYPTED TEXT  
c) ABANDONED TEXT                 d) ENCRYPTED LOCK
- 5) Monoalphabetic ciphers are stronger than Polyalphabetic ciphers because frequency analysis is tougher on the former.  
a) True                                    b) False
- 6) The  $4 \times 4$  byte matrices in the AES algorithm are called \_\_\_\_\_.  
a) States                                  b) Words  
c) Transitions                         d) Permutations
- 7) RSA algorithm is \_\_\_\_\_ cryptography algorithm.  
a) Systematic                          b) Symmetric  
c) Asymmetric                         d) None of the mentioned above
- 8) Which of the following is /are offered by the Hash functions?  
a) Authentication                      b) Non repudiation  
c) Data Integrity                        d) All of the above



- 9) Another name for Message authentication codes is \_\_\_\_\_.  
a) cryptographic codebreak                      b) cryptographic codesum  
c) cryptographic checksum                      d) cryptographic checkbreak
- 10) Which happens first authorization or authentication?  
a) Authorization  
b) Authentication  
c) Authorization & Authentication are same  
d) None of the mentioned
- 11) In Cryptography, when text is treated at the bit level, each character is replaced by \_\_\_\_\_.  
a) 4 bits                                              b) 6 bits  
c) 10 bits                                              d) 8 bits
- 12) Which of the following is not a type of symmetric-key cryptography technique?  
a) Diffie hellman cipher  
b) Caesar cipher  
c) Data encryption standard (DES)  
d) Playfair cipher
- 13) In public key encryption, if A wants to send an encrypted message \_\_\_\_\_.  
a) A encrypts message using B's public key  
b) A encrypts message using his private key  
c) A encrypts message using B's private key  
d) A encrypts message using his public key
- 14) What is data encryption standard (DES)?  
a) Block cipher                                      b) Stream cipher  
c) Bit cipher                                              d) Byte cipher

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**S.Y. (B. Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Cryptography (BTN04410)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data if necessary.

**Section – I**

- Q.2 Attempt any four.** **16**
- a) Explain the public key distribution using public key authority.
  - b) Explain in detail security mechanism.
  - c) Explain Caesar cipher with example.
  - d) Write a note on playfair cipher.
  - e) Explain the model of network security with diagram.
- Q.3 Attempt any two.** **12**
- a) Explain the working of DES with diagram.
  - b) Explain Security services in details.
  - c) Explain Transposition Technique with example.

**Section – II**

- Q.4 Attempt any four.** **16**
- a) Write note on two simple hash function.
  - b) What are the Requirements for Message Authentication Codes?
  - c) What are the application of cryptographic hash function?
  - d) Explain Kerberos in details.
  - e) Write a note on Simplified Depiction of Essential Elements of Digital Signature Process.
- Q.5 Attempt any two.** **12**
- a) Explain in detail Schnorr signature scheme.
  - b) Explain PIV System Model with diagram.
  - c) Explain Man-in-the-Middle Attack.

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| <b>Seat No.</b> |  |
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- 8) A cryptosystem is also termed as \_\_\_\_\_.  
a) secure system                      b) cipher system  
c) cipher-text                         d) secure algorithm
- 9) \_\_\_\_\_ takes the plain text and the key as input for creating cipher-text.  
a) Decryption Algorithm              b) Hashing Algorithm  
c) Tuning Algorithm                  d) Encryption Algorithm
- 10) In \_\_\_\_\_ same keys are implemented for encrypting as well as decrypting the information.  
a) Symmetric Key Encryption        b) Asymmetric Key Encryption  
c) Asymmetric Key Decryption      d) Hash-based Key Encryption
- 11) Use Caesar's Cipher to decipher the following  
HQFUBSWHG WHAW  
a) ABANDONED LOCK                  b) ENCRYPTED TEXT  
c) ABANDONED TEXT                 d) ENCRYPTED LOCK
- 12) Monoalphabetic ciphers are stronger than Polyalphabetic ciphers because frequency analysis is tougher on the former.  
a) True                                    b) False
- 13) The  $4 \times 4$  byte matrices in the AES algorithm are called \_\_\_\_\_.  
a) States                                 b) Words  
c) Transitions                         d) Permutations
- 14) RSA algorithm is \_\_\_\_\_ cryptography algorithm.  
a) Systematic                          b) Symmetric  
c) Asymmetric                         d) None of the mentioned above

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**S.Y. (B. Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Cryptography (BTN04410)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data if necessary.

**Section – I**

- Q.2 Attempt any four. 16**
- a) Explain the public key distribution using public key authority.
  - b) Explain in detail security mechanism.
  - c) Explain Caesar cipher with example.
  - d) Write a note on playfair cipher.
  - e) Explain the model of network security with diagram.
- Q.3 Attempt any two. 12**
- a) Explain the working of DES with diagram.
  - b) Explain Security services in details.
  - c) Explain Transposition Technique with example.

**Section – II**

- Q.4 Attempt any four. 16**
- a) Write note on two simple hash function.
  - b) What are the Requirements for Message Authentication Codes?
  - c) What are the application of cryptographic hash function?
  - d) Explain Kerberos in details.
  - e) Write a note on Simplified Depiction of Essential Elements of Digital Signature Process.
- Q.5 Attempt any two. 12**
- a) Explain in detail Schnorr signature scheme.
  - b) Explain PIV System Model with diagram.
  - c) Explain Man-in-the-Middle Attack.

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Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume data wherever necessary

## Marks:14

14

- Page 7 of 12

- 8) Use Caesar's Cipher to decipher the following  
HQFUBSWHG WHAW  
a) ABANDONED LOCK                      b) ENCRYPTED TEXT  
c) ABANDONED TEXT                      d) ENCRYPTED LOCK
- 9) Monoalphabetic ciphers are stronger than Polyalphabetic ciphers because frequency analysis is tougher on the former.  
a) True                                      b) False
- 10) The  $4 \times 4$  byte matrices in the AES algorithm are called \_\_\_\_\_.  
a) States                                      b) Words  
c) Transitions                              d) Permutations
- 11) RSA algorithm is \_\_\_\_\_ cryptography algorithm.  
a) Systematic                              b) Symmetric  
c) Asymmetric                              d) None of the mentioned above
- 12) Which of the following is /are offered by the Hash functions?  
a) Authentication                              b) Non repudiation  
c) Data Integrity                              d) All of the above
- 13) Another name for Message authentication codes is \_\_\_\_\_.  
a) cryptographic codebreak                      b) cryptographic codesum  
c) cryptographic checksum                      d) cryptographic checkbreak
- 14) Which happens first authorization or authentication?  
a) Authorization  
b) Authentication  
c) Authorization & Authentication are same  
d) None of the mentioned

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**S.Y. (B. Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Cryptography (BTN04410)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data if necessary.

**Section – I**

- Q.2 Attempt any four. 16**
- a) Explain the public key distribution using public key authority.
  - b) Explain in detail security mechanism.
  - c) Explain Caesar cipher with example.
  - d) Write a note on playfair cipher.
  - e) Explain the model of network security with diagram.
- Q.3 Attempt any two. 12**
- a) Explain the working of DES with diagram.
  - b) Explain Security services in details.
  - c) Explain Transposition Technique with example.

**Section – II**

- Q.4 Attempt any four. 16**
- a) Write note on two simple hash function.
  - b) What are the Requirements for Message Authentication Codes?
  - c) What are the application of cryptographic hash function?
  - d) Explain Kerberos in details.
  - e) Write a note on Simplified Depiction of Essential Elements of Digital Signature Process.
- Q.5 Attempt any two. 12**
- a) Explain in detail Schnorr signature scheme.
  - b) Explain PIV System Model with diagram.
  - c) Explain Man-in-the-Middle Attack.



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Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

### MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options. 14**

- 1) The  $4 \times 4$  byte matrices in the AES algorithm are called \_\_\_\_\_.  
a) States  
b) Words  
c) Transitions  
d) Permutations
- 2) RSA algorithm is \_\_\_\_\_ cryptography algorithm.  
a) Systematic  
b) Asymmetric  
c) Symmetric  
d) None of the mentioned above
- 3) Which of the following is /are offered by the Hash functions?  
a) Authentication  
b) Non repudiation  
c) Data Integrity  
d) All of the above
- 4) Another name for Message authentication codes is \_\_\_\_\_.  
a) cryptographic codebreak  
b) cryptographic codesum  
c) cryptographic checksum  
d) cryptographic checkbreak
- 5) Which happens first authorization or authentication?  
a) Authorization  
b) Authentication  
c) Authorization & Authentication are same  
d) None of the mentioned
- 6) In Cryptography, when text is treated at the bit level, each character is replaced by \_\_\_\_\_.  
a) 4 bits  
b) 6 bits  
c) 10 bits  
d) 8 bits
- 7) Which of the following is not a type of symmetric-key cryptography technique?  
a) Diffie hellman cipher  
b) Caesar cipher  
c) Data encryption standard (DES)  
d) Playfair cipher

- 8) In public key encryption, if A wants to send an encrypted message \_\_\_\_\_.  
a) A encrypts message using B's public key  
b) A encrypts message using his private key  
c) A encrypts message using B's private key  
d) A encrypts message using his public key
- 9) What is data encryption standard (DES)?  
a) Block cipher  
b) Stream cipher  
c) Bit cipher  
d) Byte cipher
- 10) A cryptosystem is also termed as \_\_\_\_\_.  
a) secure system  
b) cipher system  
c) cipher-text  
d) secure algorithm
- 11) \_\_\_\_\_ takes the plain text and the key as input for creating cipher-text.  
a) Decryption Algorithm  
b) Hashing Algorithm  
c) Tuning Algorithm  
d) Encryption Algorithm
- 12) In \_\_\_\_\_ same keys are implemented for encrypting as well as decrypting the information.  
a) Symmetric Key Encryption  
b) Asymmetric Key Encryption  
c) Asymmetric Key Decryption  
d) Hash-based Key Encryption
- 13) Use Caesar's Cipher to decipher the following  
HQFUBSWHG WHAW  
a) ABANDONED LOCK  
b) ENCRYPTED TEXT  
c) ABANDONED TEXT  
d) ENCRYPTED LOCK
- 14) Monoalphabetic ciphers are stronger than Polyalphabetic ciphers because frequency analysis is tougher on the former.  
a) True  
b) False

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**Set S**

**S.Y. (B. Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Cryptography (BTN04410)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data if necessary.

**Section – I**

- Q.2 Attempt any four. 16**
- a) Explain the public key distribution using public key authority.
  - b) Explain in detail security mechanism.
  - c) Explain Caesar cipher with example.
  - d) Write a note on playfair cipher.
  - e) Explain the model of network security with diagram.
- Q.3 Attempt any two. 12**
- a) Explain the working of DES with diagram.
  - b) Explain Security services in details.
  - c) Explain Transposition Technique with example.

**Section – II**

- Q.4 Attempt any four. 16**
- a) Write note on two simple hash function.
  - b) What are the Requirements for Message Authentication Codes?
  - c) What are the application of cryptographic hash function?
  - d) Explain Kerberos in details.
  - e) Write a note on Simplified Depiction of Essential Elements of Digital Signature Process.
- Q.5 Attempt any two. 12**
- a) Explain in detail Schnorr signature scheme.
  - b) Explain PIV System Model with diagram.
  - c) Explain Man-in-the-Middle Attack.

**S.Y. (B. Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Railway Engineering: A Beginner's Perspective (BTN04411)**

Max. Marks: 70

### MCQ/Objective Type Questions

Marks: 14

14

- Page 1 of 12

- 9) Proposed bullet train route in India is \_\_\_\_\_.  
a) Mumbai-Ahmedabad                      b) Delhi-Varanasi  
c) Mumbai-Bengaluru                      d) Chennai-Hyderabad
- 10) The longitudinal movement of the rails in a track is technically known as \_\_\_\_\_.  
a) Buckling                                      b) Hogging  
c) Cracking                                      d) Creeping
- 11) The first Metro train in India \_\_\_\_\_.  
a) Mumbai                                      b) Delhi  
c) Kolkata                                      d) Bengaluru
- 12) Which of the following is used as extra rail to prevent derailment?  
a) Guard rail                                      b) Stock rail  
c) Tongue rail                                      d) Wing rail
- 13) Size of the Ballast used in Points and crossings in Indian Railways \_\_\_\_\_.  
a) 20mm                                      b) 25mm  
c) 30mm                                      d) 40mm
- 14) When was the first Metro operated in Kolkata?  
a) 1986                                      b) 1987  
c) 1984                                      d) 1980

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| <b>Seat No.</b> |  |
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**Set P**

**S.Y. (B. Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Railway Engineering: A Beginner's Perspective (BTN04411)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section - I**

**Q.2 Attempt any four.** **16**

- a) What is mean by locomotive? Give its types.
- b) Explain different layers of railway tracks.
- c) Define following terminologies related to railway.
  - i) pantograph
  - ii) fishplate
  - iii) fastening
  - iv) diamond crossing
- d) Write short note on Display board System in Indian Railways.
- e) Give the types of bridges and describe any THREE.

**Q.3 Attempt any two.** **12**

- a) Which are types Electrical Switches used in Railways? Explain.
- b) Write a short note on Safety measures in Railways.
- c) Define control system with its types.

**Section – II**

**Q.4 Attempt any four.** **16**

- a) Give details of any FOUR High powered locomotives in IR.
- b) Explain the concept of “Anubhuti” Coaches in Indian Railways.
- c) Explain Railway tracking system.
- d) Give Main functions in rail track & Which Material is used for Railing system?
- e) What is Clean Energy concept in Railways? Explain.

**Q.5 Attempt any two.** **12**

- a) Write note on Bullet Trains. Give Advantages & disadvantages of Bullet Train in India?
- b) Write Note on Bio Toilets in Indian Railway.
- c) Which are the recent trends in International Railway?

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**Set Q****S.Y. (B. Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024****ELECTRONICS & TELECOMMUNICATION ENGINEERING****Railway Engineering: A Beginner's Perspective (BTN04411)**Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.****14**

- 1) Which is not part of Railway track layer?
  - a) Ballast
  - b) Fishplate
  - c) Switch
  - d) Subgrade
- 2) Proposed bullet train route in India is \_\_\_\_\_.
  - a) Mumbai-Ahmedabad
  - b) Delhi-Varanasi
  - c) Mumbai-Bengaluru
  - d) Chennai-Hyderabad
- 3) The longitudinal movement of the rails in a track is technically known as \_\_\_\_\_.
  - a) Buckling
  - b) Hogging
  - c) Cracking
  - d) Creeping
- 4) The first Metro train in India \_\_\_\_\_.
  - a) Mumbai
  - b) Delhi
  - c) Kolkata
  - d) Bengaluru
- 5) Which of the following is used as extra rail to prevent derailment?
  - a) Guard rail
  - b) Stock rail
  - c) Tongue rail
  - d) Wing rail
- 6) Size of the Ballast used in Points and crossings in Indian Railways \_\_\_\_\_.
  - a) 20mm
  - b) 25mm
  - c) 30mm
  - d) 40mm
- 7) When was the first Metro operated in Kolkata?
  - a) 1986
  - b) 1987
  - c) 1984
  - d) 1980
- 8) Which of the following is not the part of track layer \_\_\_\_\_.
  - a) Fastners
  - b) Ballast
  - c) Pantograph
  - d) Cushion Ballast
- 9) The ballast material generally used in IR \_\_\_\_\_.
  - a) Moorum
  - b) Broken stones
  - c) Gravel
  - d) All of the above

- 10)** Railway locomotive (Engine) not in Working Nowadays \_\_\_\_\_.  
a) Steam  
b) Electric  
c) Diesel  
d) AC Electric
- 11)** Pantograph is Mounted \_\_\_\_\_.  
a) At driver's cabin  
b) At track  
c) At Railway roof  
d) At Bogie
- 12)** Highest post in Railway \_\_\_\_\_.  
a) General Manager  
b) Chief Engineer  
c) Chairman Railway Board  
d) Divisional Railway Manager
- 13)** Which are not types of Railway Switches?  
a) Simple turn out  
b) Straight turnout  
c) Left turnout  
d) Right turnout
- 14)** \_\_\_\_\_ are used to fix rails to wooden sleepers.  
a) Fasteners  
b) Spikes  
c) Rivets  
d) Nails



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**Set Q****S.Y. (B. Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024****ELECTRONICS & TELECOMMUNICATION ENGINEERING****Railway Engineering: A Beginner's Perspective (BTN04411)**

Day &amp; Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section - I****Q.2 Attempt any four. 16**

- a) What is mean by locomotive? Give its types.
- b) Explain different layers of railway tracks.
- c) Define following terminologies related to railway.
  - i) pantograph
  - ii) fishplate
  - iii) fastening
  - iv) diamond crossing
- d) Write short note on Display board System in Indian Railways.
- e) Give the types of bridges and describe any THREE.

**Q.3 Attempt any two. 12**

- a) Which are types Electrical Switches used in Railways? Explain.
- b) Write a short note on Safety measures in Railways.
- c) Define control system with its types.

**Section – II****Q.4 Attempt any four. 16**

- a) Give details of any FOUR High powered locomotives in IR.
- b) Explain the concept of “Anubhuti” Coaches in Indian Railways.
- c) Explain Railway tracking system.
- d) Give Main functions in rail track & Which Material is used for Railing system?
- e) What is Clean Energy concept in Railways? Explain.

**Q.5 Attempt any two. 12**

- a) Write note on Bullet Trains. Give Advantages & disadvantages of Bullet Train in India?
- b) Write Note on Bio Toilets in Indian Railway.
- c) Which are the recent trends in International Railway?

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# ELECTRONICS & TELECOMMUNICATION ENGINEERING

# Railway Engineering: A Beginner's Perspective (BTN04411)

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
3) Figures to the right indicates full marks.

### MCQ/Objective Type Questions

Marks: 14

14

- 1) The first Metro train in India \_\_\_\_\_.  
a) Mumbai  
b) Delhi  
c) Kolkata  
d) Bengaluru
- 2) Which of the following is used as extra rail to prevent derailment?  
a) Guard rail  
b) Stock rail  
c) Tongue rail  
d) Wing rail
- 3) Size of the Ballast used in Points and crossings in Indian Railways \_\_\_\_\_.  
a) 20mm  
b) 25mm  
c) 30mm  
d) 40mm
- 4) When was the first Metro operated in Kolkata?  
a) 1986  
b) 1987  
c) 1984  
d) 1980
- 5) Which of the following is not the part of track layer \_\_\_\_\_.  
a) Fastners  
b) Ballast  
c) Pantograph  
d) Cushion Ballast
- 6) The ballast material generally used in IR \_\_\_\_\_.  
a) Moorum  
b) Broken stones  
c) Gravel  
d) All of the above
- 7) Railway locomotive (Engine) not in Working Nowadays \_\_\_\_\_.  
a) Steam  
b) Electric  
c) Diesel  
d) AC Electric
- 8) Pantograph is Mounted \_\_\_\_\_.  
a) At driver's cabin  
b) At track  
c) At Railway roof  
d) At Bogie
- 9) Highest post in Railway \_\_\_\_\_.  
a) General Manager  
b) Chief Engineer  
c) Chairman Railway Board  
d) Divisional Railway Manager
- 10) Which are not types of Railway Switches?  
a) Simple turn out  
b) Straight turnout  
c) Left turnout  
d) Right turnout

- 11) \_\_\_\_\_ are used to fix rails to wooden sleepers.
- |              |           |
|--------------|-----------|
| a) Fasteners | b) Spikes |
| c) Rivets    | d) Nails  |
- 12) Which is not part of Railway track layer?
- |            |              |
|------------|--------------|
| a) Ballast | b) Fishplate |
| c) Switch  | d) Subgrade  |
- 13) Proposed bullet train route in India is \_\_\_\_\_.
- |                     |                      |
|---------------------|----------------------|
| a) Mumbai-Ahmedabad | b) Delhi-Varanasi    |
| c) Mumbai-Bengaluru | d) Chennai-Hyderabad |
- 14) The longitudinal movement of the rails in a track is technically known as \_\_\_\_\_.
- |             |             |
|-------------|-------------|
| a) Buckling | b) Hogging  |
| c) Cracking | d) Creeping |

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**Set R**

**S.Y. (B. Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRONICS & TELECOMMUNICATION ENGINEERING**  
**Railway Engineering: A Beginner's Perspective (BTN04411)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section - I**

**Q.2 Attempt any four.** **16**

- a) What is mean by locomotive? Give its types.
- b) Explain different layers of railway tracks.
- c) Define following terminologies related to railway.
  - i) pantograph
  - ii) fishplate
  - iii) fastening
  - iv) diamond crossing
- d) Write short note on Display board System in Indian Railways.
- e) Give the types of bridges and describe any THREE.

**Q.3 Attempt any two.** **12**

- a) Which are types Electrical Switches used in Railways? Explain.
- b) Write a short note on Safety measures in Railways.
- c) Define control system with its types.

**Section – II**

**Q.4 Attempt any four.** **16**

- a) Give details of any FOUR High powered locomotives in IR.
- b) Explain the concept of “Anubhuti” Coaches in Indian Railways.
- c) Explain Railway tracking system.
- d) Give Main functions in rail track & Which Material is used for Railing system?
- e) What is Clean Energy concept in Railways? Explain.

**Q.5 Attempt any two.** **12**

- a) Write note on Bullet Trains. Give Advantages & disadvantages of Bullet Train in India?
- b) Write Note on Bio Toilets in Indian Railway.
- c) Which are the recent trends in International Railway?

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| <b>Set</b> | <b>S</b> |
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**S.Y. (B. Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024**

**ELECTRONICS & TELECOMMUNICATION ENGINEERING**

**Railway Engineering: A Beginner's Perspective (BTN04411)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
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3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) Which are not types of Railway Switches?
  - a) Simple turn out
  - b) Straight turnout
  - c) Left turnout
  - d) Right turnout
- 2) \_\_\_\_\_ are used to fix rails to wooden sleepers.
  - a) Fasteners
  - b) Spikes
  - c) Rivets
  - d) Nails
- 3) Which is not part of Railway track layer?
  - a) Ballast
  - b) Fishplate
  - c) Switch
  - d) Subgrade
- 4) Proposed bullet train route in India is \_\_\_\_\_.
  - a) Mumbai-Ahmedabad
  - b) Delhi-Varanasi
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- 5) The longitudinal movement of the rails in a track is technically known as \_\_\_\_\_.
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  - d) Creeping
- 6) The first Metro train in India \_\_\_\_\_.
  - a) Mumbai
  - b) Delhi
  - c) Kolkata
  - d) Bengaluru
- 7) Which of the following is used as extra rail to prevent derailment?
  - a) Guard rail
  - b) Stock rail
  - c) Tongue rail
  - d) Wing rail
- 8) Size of the Ballast used in Points and crossings in Indian Railways \_\_\_\_\_.
  - a) 20mm
  - b) 25mm
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  - d) 40mm
- 9) When was the first Metro operated in Kolkata?
  - a) 1986
  - b) 1987
  - c) 1984
  - d) 1980

- 10)** Which of the following is not the part of track layer \_\_\_\_\_.  
a) Fasteners                                      b) Ballast  
c) Pantograph                                    d) Cushion Ballast
- 11)** The ballast material generally used in IR \_\_\_\_\_.  
a) Moorum                                        b) Broken stones  
c) Gravel                                          d) All of the above
- 12)** Railway locomotive (Engine) not in Working Nowadays \_\_\_\_\_.  
a) Steam                                            b) Electric  
c) Diesel                                             d) AC Electric
- 13)** Pantograph is Mounted \_\_\_\_\_.  
a) At driver's cabin                                b) At track  
c) At Railway roof                                 d) At Bogie
- 14)** Highest post in Railway \_\_\_\_\_.  
a) General Manager                                b) Chief Engineer  
c) Chairman Railway Board                     d) Divisional Railway Manager

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**Set S****S.Y. (B. Tech.) (Sem-II) (New) (CBCS) Examination: March/April - 2024****ELECTRONICS & TELECOMMUNICATION ENGINEERING****Railway Engineering: A Beginner's Perspective (BTN04411)**

Day &amp; Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section - I****Q.2 Attempt any four. 16**

- a) What is mean by locomotive? Give its types.
- b) Explain different layers of railway tracks.
- c) Define following terminologies related to railway.
  - i) pantograph
  - ii) fishplate
  - iii) fastening
  - iv) diamond crossing
- d) Write short note on Display board System in Indian Railways.
- e) Give the types of bridges and describe any THREE.

**Q.3 Attempt any two. 12**

- a) Which are types Electrical Switches used in Railways? Explain.
- b) Write a short note on Safety measures in Railways.
- c) Define control system with its types.

**Section – II****Q.4 Attempt any four. 16**

- a) Give details of any FOUR High powered locomotives in IR.
- b) Explain the concept of “Anubhuti” Coaches in Indian Railways.
- c) Explain Railway tracking system.
- d) Give Main functions in rail track & Which Material is used for Railing system?
- e) What is Clean Energy concept in Railways? Explain.

**Q.5 Attempt any two. 12**

- a) Write note on Bullet Trains. Give Advantages & disadvantages of Bullet Train in India?
- b) Write Note on Bio Toilets in Indian Railway.
- c) Which are the recent trends in International Railway?

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| <b>Set</b> | <b>P</b> |
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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**INFORMATION TECHNOLOGY ENGINEERING**  
**Computer Networks (BTN05404)**

Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.  
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
3) Figures to the right indicates full marks.  
4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Solve Multiple Choice Questions.**

**14**

- 1) The DHCP server \_\_\_\_\_.
  - a) Maintains a database of available IP addresses
  - b) Maintains the information about client configuration parameters
  - c) Grants a IP address when receives a request from a client
  - d) All of the mentioned
- 2) The values GET, POST, HEAD are specified in \_\_\_\_\_ of HTTP message.
  - a) Request line
  - b) Header line
  - c) Status line
  - d) Entity body
- 3) When the mail server sends mail to other mail servers it becomes \_\_\_\_\_.
  - a) SMTP server
  - b) SMTP client
  - c) Peer
  - d) Master
- 4) The entire hostname has a maximum of \_\_\_\_\_.
  - a) 255 characters
  - b) 127 characters
  - c) 63 characters
  - d) 31 characters
- 5) Which amongst the following statements is correct for "character at a time" mode?
  - a) Character processing is done on the local system under the control of the remote system
  - b) Most text typed is immediately sent to the remote host for processing
  - c) All text is echoed locally, only completed lines are sent to the remote host
  - d) All text is processed locally, and only confirmed lines are sent to the remote host
- 6) Which one of the following is not true?
  - a) Telnet defines a network virtual terminal (NVT) standard
  - b) Client programs interact with NVT
  - c) Server translates NVT operations
  - d) Client can transfer files using to remote server using NVT





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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**INFORMATION TECHNOLOGY ENGINEERING**  
**Computer Networks (BTN05404)**

Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data wherever necessary.

**Section – I**

- Q.2 Attempt the following (Any Three) 12**  
a) State and illustrate the different levels of addressing.  
b) Illustrate the concurrency in client and server paradigm.  
c) Explain the fragmentation w. r. t. IP protocol.  
d) Draw and illustrate the connection establishment in TCP.
- Q.3 Explain the following w.r.t error control in TCP. 08**  
a) Acknowledgement  
b) Retransmission  
c) Out of order segments

**OR**

Illustrate the flow diagram for connection-oriented, concurrent communication the services of TCP.

- Q.4 Attempt any two. 08**  
a) SCTP services  
b) Special addresses  
c) UDP Services

**Section – II**

- Q.5 Attempt the following. (Any Three) 12**  
a) Illustrate the message access agent w.r.t SMTP.  
b) Draw and explain the packet format of DHCP.  
c) Explain the different platforms of DNS used over the Internet.  
d) Explain the out of band signalling and mode of operation in TELNET.
- Q.6 Explain the following w.r.t DNS. 08**  
a) Resolution  
b) DNS  
c) Types of Records

**OR**

Explain the role of message transfer agent in an electronic mail system.

- Q.7 Attempt any two. 08**  
a) User Agent  
b) Connection & data transfer in TFTP  
c) BOOTP Operation

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| <b>Seat No.</b> |  |
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Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.

## Marks: 14

## 14

- Page 4 of 12

- 8) The DHCP server \_\_\_\_\_.  
a) Maintains a database of available IP addresses  
b) Maintains the information about client configuration parameters  
c) Grants a IP address when receives a request from a client  
d) All of the mentioned
- 9) The values GET, POST, HEAD are specified in \_\_\_\_\_ of HTTP message.  
a) Request line  
b) Header line  
c) Status line  
d) Entity body
- 10) When the mail server sends mail to other mail servers it becomes \_\_\_\_\_.  
a) SMTP server  
b) SMTP client  
c) Peer  
d) Master
- 11) The entire hostname has a maximum of \_\_\_\_\_.  
a) 255 characters  
b) 127 characters  
c) 63 characters  
d) 31 characters
- 12) Which amongst the following statements is correct for “character at a time” mode?  
a) Character processing is done on the local system under the control of the remote system  
b) Most text typed is immediately sent to the remote host for processing  
c) All text is echoed locally, only completed lines are sent to the remote host  
d) All text is processed locally, and only confirmed lines are sent to the remote host
- 13) Which one of the following is not true?  
a) Telnet defines a network virtual terminal (NVT) standard  
b) Client programs interact with NVT  
c) Server translates NVT operations  
d) Client can transfer files using to remote server using NVT
- 14) Which of the following is true for character mode operation of telnet implementation?  
a) Each character typed is sent by the client to the server  
b) Each character typed is discarded by the server  
c) Each character typed is aggregated into a word and then sent to the server  
d) Each character type is aggregated into a line and then sent to the server

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**Set Q**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**INFORMATION TECHNOLOGY ENGINEERING**  
**Computer Networks (BTN05404)**

Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data wherever necessary.

**Section – I**

- Q.2 Attempt the following (Any Three) 12**  
a) State and illustrate the different levels of addressing.  
b) Illustrate the concurrency in client and server paradigm.  
c) Explain the fragmentation w. r. t. IP protocol.  
d) Draw and illustrate the connection establishment in TCP.
- Q.3 Explain the following w.r.t error control in TCP. 08**  
a) Acknowledgement  
b) Retransmission  
c) Out of order segments

**OR**

Illustrate the flow diagram for connection-oriented, concurrent communication the services of TCP.

- Q.4 Attempt any two. 08**  
a) SCTP services  
b) Special addresses  
c) UDP Services

**Section – II**

- Q.5 Attempt the following. (Any Three) 12**  
a) Illustrate the message access agent w.r.t SMTP.  
b) Draw and explain the packet format of DHCP.  
c) Explain the different platforms of DNS used over the Internet.  
d) Explain the out of band signalling and mode of operation in TELNET.
- Q.6 Explain the following w.r.t DNS. 08**  
a) Resolution  
b) DNS  
c) Types of Records

**OR**

Explain the role of message transfer agent in an electronic mail system.

- Q.7 Attempt any two. 08**  
a) User Agent  
b) Connection & data transfer in TFTP  
c) BOOTP Operation

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Set **R**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**INFORMATION TECHNOLOGY ENGINEERING**  
**Computer Networks (BTN05404)**

Day & Date: Sunday, 26-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Solve Multiple Choice Questions.****14**

- 1) Which one of the following authentication method is used by SSH?
  - a) public-key
  - b) host based
  - c) Password
  - d) all of these
- 2) Simple mail transfer protocol utilizes \_\_\_\_\_ as the transport layer protocol for electronic mail transfer.
  - a) TCP
  - b) UDP
  - c) DHCP
  - d) SCTP
- 3) If 5 files are transferred from server A to client B in the same session. The number of TCP connection between A and B is:
  - a) 5
  - b) 10
  - c) 2
  - d) 6
- 4) Mode of data transfer in FTP, where all these left to TCP.
  - a) Stream mode
  - b) Block mode
  - c) Compressed mode
  - d) None of these
- 5) The DHCP server \_\_\_\_\_.
  - a) Maintains a database of available IP addresses
  - b) Maintains the information about client configuration parameters
  - c) Grants a IP address when receives a request from a client
  - d) All of the mentioned
- 6) The values GET, POST, HEAD are specified in \_\_\_\_\_ of HTTP message.
  - a) Request line
  - b) Header line
  - c) Status line
  - d) Entity body
- 7) When the mail server sends mail to other mail servers it becomes \_\_\_\_\_.
  - a) SMTP server
  - b) SMTP client
  - c) Peer
  - d) Master
- 8) The entire hostname has a maximum of \_\_\_\_\_.
  - a) 255 characters
  - b) 127 characters
  - c) 63 characters
  - d) 31 characters

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**INFORMATION TECHNOLOGY ENGINEERING**  
**Computer Networks (BTN05404)**

Day & Date: Sunday, 26-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data wherever necessary.

**Section – I**

- Q.2 Attempt the following (Any Three) 12**  
 a) State and illustrate the different levels of addressing.  
 b) Illustrate the concurrency in client and server paradigm.  
 c) Explain the fragmentation w. r. t. IP protocol.  
 d) Draw and illustrate the connection establishment in TCP.
- Q.3 Explain the following w.r.t error control in TCP. 08**  
 a) Acknowledgement  
 b) Retransmission  
 c) Out of order segments

**OR**

Illustrate the flow diagram for connection-oriented, concurrent communication the services of TCP.

- Q.4 Attempt any two. 08**  
 a) SCTP services  
 b) Special addresses  
 c) UDP Services

**Section – II**

- Q.5 Attempt the following. (Any Three) 12**  
 a) Illustrate the message access agent w.r.t SMTP.  
 b) Draw and explain the packet format of DHCP.  
 c) Explain the different platforms of DNS used over the Internet.  
 d) Explain the out of band signalling and mode of operation in TELNET.
- Q.6 Explain the following w.r.t DNS. 08**  
 a) Resolution  
 b) DNS  
 c) Types of Records

**OR**

Explain the role of message transfer agent in an electronic mail system.

- Q.7 Attempt any two. 08**  
 a) User Agent  
 b) Connection & data transfer in TFTP  
 c) BOOTP Operation



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Set **S**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**INFORMATION TECHNOLOGY ENGINEERING**  
**Computer Networks (BTN05404)**

Day & Date: Sunday, 26-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Solve Multiple Choice Questions.**

**14**

- 1) Which one of the following is not true?
  - a) Telnet defines a network virtual terminal (NVT) standard
  - b) Client programs interact with NVT
  - c) Server translates NVT operations
  - d) Client can transfer files using to remote server using NVT
- 2) Which of the following is true for character mode operation of telnet implementation?
  - a) Each character typed is sent by the client to the server
  - b) Each character typed is discarded by the server
  - c) Each character typed is aggregated into a word and then sent to the server
  - d) Each character type is aggregated into a line and then sent to the server
- 3) The technique in which a congested node stops receiving data from the immediate upstream node or nodes is called as \_\_\_\_\_.
  - a) Admission policy
  - b) Backpressure
  - c) Forward signalling
  - d) Backward signalling
- 4) Transmission control protocol \_\_\_\_\_.
  - a) is a connection-oriented protocol
  - b) uses a three way handshake to establish a connection
  - c) receives data from application as a single stream
  - d) all of these
- 5) Transport layer protocols deals with \_\_\_\_\_.
  - a) application to application communication
  - b) process to process communication
  - c) node to node communication
  - d) man to man communication
- 6) Which one of the following authentication method is used by SSH?
  - a) public-key
  - b) host based
  - c) password
  - d) all of these

- 7) Simple mail transfer protocol utilizes \_\_\_\_\_ as the transport layer protocol for electronic mail transfer.
- a) TCP
  - b) UDP
  - c) DHCP
  - d) SCTP
- 8) If 5 files are transferred from server A to client B in the same session. The number of TCP connection between A and B is:
- a) 5
  - b) 10
  - c) 2
  - d) 6
- 9) Mode of data transfer in FTP, where all these left to TCP.
- a) Stream mode
  - b) Block mode
  - c) Compressed mode
  - d) None of these
- 10) The DHCP server \_\_\_\_\_.
- a) Maintains a database of available IP addresses
  - b) Maintains the information about client configuration parameters
  - c) Grants a IP address when receives a request from a client
  - d) All of the mentioned
- 11) The values GET, POST, HEAD are specified in \_\_\_\_\_ of HTTP message.
- a) Request line
  - b) Header line
  - c) Status line
  - d) Entity body
- 12) When the mail server sends mail to other mail servers it becomes \_\_\_\_\_.
- a) SMTP server
  - b) SMTP client
  - c) Peer
  - d) Master
- 13) The entire hostname has a maximum of \_\_\_\_\_.
- a) 255 characters
  - b) 127 characters
  - c) 63 characters
  - d) 31 characters
- 14) Which amongst the following statements is correct for "character at a time" mode?
- a) Character processing is done on the local system under the control of the remote system
  - b) Most text typed is immediately sent to the remote host for processing
  - c) All text is echoed locally, only completed lines are sent to the remote host
  - d) All text is processed locally, and only confirmed lines are sent to the remote host

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**INFORMATION TECHNOLOGY ENGINEERING**  
**Computer Networks (BTN05404)**

Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All question are compulsory.  
2) Figures to the right indicate full marks.  
3) Assume suitable data wherever necessary.

**Section – I**

- Q.2 Attempt the following (Any Three) 12**  
a) State and illustrate the different levels of addressing.  
b) Illustrate the concurrency in client and server paradigm.  
c) Explain the fragmentation w. r. t. IP protocol.  
d) Draw and illustrate the connection establishment in TCP.
- Q.3 Explain the following w.r.t error control in TCP. 08**  
a) Acknowledgement  
b) Retransmission  
c) Out of order segments

**OR**

Illustrate the flow diagram for connection-oriented, concurrent communication the services of TCP.

- Q.4 Attempt any two. 08**  
a) SCTP services  
b) Special addresses  
c) UDP Services

**Section – II**

- Q.5 Attempt the following. (Any Three) 12**  
a) Illustrate the message access agent w.r.t SMTP.  
b) Draw and explain the packet format of DHCP.  
c) Explain the different platforms of DNS used over the Internet.  
d) Explain the out of band signalling and mode of operation in TELNET.
- Q.6 Explain the following w.r.t DNS. 08**  
a) Resolution  
b) DNS  
c) Types of Records

**OR**

Explain the role of message transfer agent in an electronic mail system.

- Q.7 Attempt any two. 08**  
a) User Agent  
b) Connection & data transfer in TFTP  
c) BOOTP Operation

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Engineering Mathematics – III (BTN07301)**

Max. Marks: 70

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Use of non-programmable calculator is allowed.

## Marks:14

## 14

- 1) If the differential equation  $\frac{d^n y}{dx^n} + P_1 \frac{d^{n-1} y}{dx^{n-1}} + \dots + P_n y = X$  is a linear differential equation with constant coefficients then the R.H.S. is a \_\_\_\_\_.  
a) Constant  
b) function of  $x$   
c) function of  $y$   
d) function of  $x$  and  $y$
- 2)  $\frac{1}{D+1}(\log x + \frac{1}{x})$  is equal to \_\_\_\_\_.  
a)  $e^x$   
b)  $\log x$   
c)  $x$   
d) 1
- 3)  $y = (c_1 + c_2 x)e^{2x} + (c_3 + c_4 x)e^{-2x}$  is the general solution of \_\_\_\_\_.  
a)  $(D^2 + 2)^2 y = 0$   
b)  $(D^2 - 2)^2 y = 0$   
c)  $(D^2 + 4)^2 y = 0$   
d)  $(D^2 - 4)^2 y = 0$
- 4) The particular integral of  $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} = \frac{1}{x^2}$  is \_\_\_\_\_.  
a)  $y = c_1 + c_2 x^2$   
b)  $y = x - \frac{1}{x^2}$   
c)  $y = \frac{1}{2x^2}$   
d)  $y = \frac{1}{x^2}$
- 5) The general solution of  $(3x + 2)^2 \frac{d^2 y}{dx^2} + 5(3x + 2) \frac{dy}{dx} - 3y = 0$  is  $y =$  \_\_\_\_\_.  
a)  $(c_1 + c_2 x)e^{2x}$   
b)  $c_1 e^{2x} + c_2 e^{4x}$   
c)  $c_1(3x + 2)^{1/3} + c_2(3x + 2)^{-1}$   
d)  $c_1(x + 3)^2 + c_2(x + 3)^3$
- 6) If  $L[f(t)] = \phi(s)$ , then  $L[f(at)]$  is \_\_\_\_\_.  
a)  $\phi(\frac{s}{a})$   
b)  $\frac{1}{s} \phi(\frac{s}{a})$   
c)  $\frac{1}{a} \phi(\frac{s}{a})$   
d)  $a \cdot \phi(\frac{s}{a})$

- 7) The Laplace transform of  $t \cosh t$  is \_\_\_\_\_.  
 a)  $\frac{s^2 - 1}{(s^2 + 1)^2}$  b)  $-\frac{s^2 - 1}{(s + 1)^2}$   
 c)  $\frac{s^2 + 1}{(s^2 - 1)^2}$  d)  $-\frac{s^2 + 1}{(s^2 - 1)^2}$
- 8) The value of  $\int_c \frac{(z+6) dz}{z^2-4}$  where  $c$  is the circle  $|z - 2| = 1$  is \_\_\_\_\_.  
 a)  $2\pi$  b)  $4\pi i$   
 c)  $2\pi i$  d)  $4\pi$
- 9)  $\int_c (y - x - 3x^2 i) dz$  where  $c$  is the straight line from  $z = 0$  to  $z = 1 + i$  is \_\_\_\_\_.  
 a)  $1 + i$  b)  $1 - i$   
 c)  $i$  d)  $-i$
- 10) If  $Z\{f(k)\} = F(z)$ , then  $Z\{kf(k)\} =$  \_\_\_\_\_.  
 a)  $\frac{dF(z)}{dz}$  b)  $-\frac{dF(z)}{dz}$   
 c)  $z \frac{dF(z)}{dz}$  d)  $-z \frac{dF(z)}{dz}$
- 11) If  $\delta(k) = \begin{cases} 1, & k = 0 \\ 0, & \text{otherwise} \end{cases}$  then  $Z\{\delta(k)\} =$  \_\_\_\_\_.  
 a)  $0$  b)  $1$   
 c)  $Z$  d)  $1/z$
- 12) The ROC of Z-transform of the sequence  $F(k) = \begin{cases} (\frac{1}{2})^k, & k \leq 0 \\ (\frac{1}{3})^k, & k > 0 \end{cases}$  is \_\_\_\_\_.  
 a)  $|Z| > \frac{1}{2}$  b)  $|Z| > \frac{1}{3}$   
 c)  $2 < |Z| < 3$  d)  $\frac{1}{3} < |Z| < \frac{1}{2}$
- 13) The solution of the question  $p q = p + q$  is \_\_\_\_\_.  
 a)  $z = ax + (a + 1)y + c$  b)  $z = (a + 1)x + a(a - 1)y + c$   
 c)  $z(a - 1) = a(a - 1)x + ay + c$  d)  $z = (a - 1)x + a(a + 1)y + c$
- 14)  $Z = a(x + y) + c$  is the general solution of \_\_\_\_\_.  
 a)  $P q = 1$  b)  $p = 1 - q$   
 c)  $P + q = 0$  d)  $p = q$

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Set **P**

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Engineering Mathematics – III (BTN07301)**

Day & Date: Monday, 13-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Use of non-programmable calculator is allowed.

## Section – I

**Q.2 Attempt any Three of the following. 09**

- Solve  $(D^3 + 3D^2 + 3D + 1)y = e^{-x}$
- Solve  $(D^3 + D)y = \cos x$ .
- Solve  $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x$
- Calculate  $L\{te^{-4t} \sin 3t\}$
- Calculate  $L\left\{\int_0^t u \cdot e^{-4u} \sin 5u \, du\right\}$

**Q.3 Attempt any Three of the following. 09**

- Solve  $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = e^{e^x}$
- Solve  $(D^2 - 2D + 1)y = x \cdot e^x \sin x$ .
- Solve  $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} + y = 2 \sin(\log(1 + x))$
- Evaluate  $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$
- Find the Laplace Transform of  $(1 + 2t - 3t^2 + 4t^3)H(t - 3)$

**Q.4 Attempt any Two of the following. 10**

- An e.m.f.  $E \sin pt$  is applied at  $t = 0$  to a circuit containing a condenser  $C$  and inductance  $L$  in series. The current  $X$  satisfies the equation  $L \frac{dx}{dt} + \frac{1}{c} \int X \, dt = E \sin pt$ , where  $X = \frac{dq}{dt}$ . If  $p^2 = \frac{1}{LC}$  and initially the current  $X$  and charge  $q$  are zero, find the current in the circuit at time  $t$ .
- Calculate inverse Laplace transform of  $\frac{s^2}{(s^2+4)(s^2+9)}$  by using Convolution Method.
- Solve  $(D^2 - D - 2)y = 2 \log x + \frac{1}{x} + \frac{1}{x^2}$ .

## Section – II

**Q.5 Attempt any three of the following. 09**

- Solve  $pq = x^4 y^3 z^4$ .
- Solve  $pe^y = qe^x$
- Evaluate  $\oint \frac{e^{2z}}{(z-1)(z-2)} dz$  where  $c$  is the circle  $|z| = 3$
- Calculate  $Z\{f(k)\}$  and the region of convergence of  $f(k) = k2^k, k \geq 0$
- Calculate  $Z\{f(k)\}$  where  $f(k) = \left(\frac{1}{3}\right)^{|k|}$  for all  $k$ .

**Q.6 Attempt any three of the following. 09**

- Solve  $p(1+q) = qz$ .
- Solve  $x(y-z)p + y(z-x)q = z(x-y)$
- Evaluate  $\oint \frac{z+2}{(z-3)(z-4)} dz$  where  $c$  is the circle  $|z| = 1$
- Calculate Z-Transform of  $f(x) = 2^k \cos\{3k+2\}, k \geq 0$ .
- Calculate inverse Z-Transform of  $F(z) = \frac{1}{(z-5)^2}$  when  $|z| > 5$

**Q.7 Attempt any two of the following. 10**

- Evaluate  $\int_0^{2+i} z^2 dz$ 
  - Along the line  $x = 2y$
  - along the real axis from  $z = 0$  to  $z = 2$  and then along the line parallel to the imaginary axis from  $z = 2$  to  $z = 2 + i$
  - along the imaginary axis from  $z = 0$  to  $z = i$  and then along the line parallel to the real axis from  $z = i$  to  $z = 2 + i$  along the parabola  $2y^2 = x$ .
- Calculate inverse Z-Transform of  $F(z) = \frac{3z^2 - 18z + 26}{(z-2)(z-3)(z-4)}$  if region of Convergence is  $3 < |z| < 4$
- Use variable separable method to solve  $\frac{\partial z}{\partial x} = 4 \frac{\partial z}{\partial y}$  given  $z(0, y) = 8e^{-3y}$

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Max. Marks: 70

Marks:14

## 14

- Page 5 of 16



- 7)  $Z = a(x + y) + c$  is the general solution of \_\_\_\_\_.  
 a)  $Pq = 1$  b)  $p = 1 - q$   
 c)  $P + q = 0$  d)  $p = q$
- 8) If the differential equation  $\frac{d^n y}{dx^n} + P_1 \frac{d^{n-1} y}{dx^{n-1}} + \dots + P_n y = X$  is a linear differential equation with constant coefficients then the R.H.S. is a \_\_\_\_\_.  
 a) Constant b) function of  $x$   
 c) function of  $y$  d) function of  $x$  and  $y$
- 9)  $\frac{1}{D+1} (\log x + \frac{1}{x})$  is equal to \_\_\_\_\_.  
 a)  $e^x$  b)  $\log x$   
 c)  $x$  d)  $1$
- 10)  $y = (c_1 + c_2 x)e^{2x} + (c_3 + c_4 x)e^{-2x}$  is the general solution of \_\_\_\_\_.  
 a)  $(D^2 + 2)^2 y = 0$  b)  $(D^2 - 2)^2 y = 0$   
 c)  $(D^2 + 4)^2 y = 0$  d)  $(D^2 - 4)^2 y = 0$
- 11) The particular integral of  $x^2 \frac{d^2 y}{dx^2} + 2x \frac{dy}{dx} = \frac{1}{x^2}$  is \_\_\_\_\_.  
 a)  $y = c_1 + c_2 x^2$  b)  $y = x - \frac{1}{x^2}$   
 c)  $y = \frac{1}{2x^2}$  d)  $y = \frac{1}{x^2}$
- 12) The general solution of  $(3x + 2)^2 \frac{d^2 y}{dx^2} + 5(3x + 2) \frac{dy}{dx} - 3y = 0$  is  $y =$  \_\_\_\_\_.  
 a)  $(c_1 + c_2 x)e^{2x}$  b)  $c_1 e^{2x} + c_2 e^{4x}$   
 c)  $c_1 (3x + 2)^{1/3} + c_2 (3x + 2)^{-1}$  d)  $c_1 (x + 3)^2 + c_2 (x + 3)^3$
- 13) If  $L[f(t)] = \phi(s)$ , then  $L[f(at)]$  is \_\_\_\_\_.  
 a)  $\phi(\frac{s}{a})$  b)  $\frac{1}{s} \phi(\frac{s}{a})$   
 c)  $\frac{1}{a} \phi(\frac{s}{a})$  d)  $a. \phi(\frac{s}{a})$
- 14) The Laplace transform of  $t \cosh t$  is \_\_\_\_\_.  
 a)  $\frac{s^2 - 1}{(s^2 + 1)^2}$  b)  $-\frac{s^2 - 1}{(s + 1)^2}$   
 c)  $\frac{s^2 + 1}{(s^2 - 1)^2}$  d)  $-\frac{s^2 + 1}{(s^2 - 1)^2}$

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Set **Q**

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Engineering Mathematics – III (BTN07301)**

Day & Date: Monday, 13-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Use of non-programmable calculator is allowed.

## Section – I

**Q.2 Attempt any Three of the following.** **09**

- Solve  $(D^3 + 3D^2 + 3D + 1)y = e^{-x}$
- Solve  $(D^3 + D)y = \cos x$ .
- Solve  $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x$
- Calculate  $L\{te^{-4t} \sin 3t\}$
- Calculate  $L\left\{\int_0^t u \cdot e^{-4u} \sin 5u \, du\right\}$

**Q.3 Attempt any Three of the following.** **09**

- Solve  $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = e^{e^x}$
- Solve  $(D^2 - 2D + 1)y = x \cdot e^x \sin x$ .
- Solve  $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} + y = 2 \sin(\log(1 + x))$
- Evaluate  $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$
- Find the Laplace Transform of  $(1 + 2t - 3t^2 + 4t^3)H(t - 3)$

**Q.4 Attempt any Two of the following.** **10**

- An e.m.f.  $E \sin pt$  is applied at  $t = 0$  to a circuit containing a condenser  $C$  and inductance  $L$  in series. The current  $X$  satisfies the equation  $L \frac{dx}{dt} + \frac{1}{C} \int X \, dt = E \sin pt$ , where  $X = \frac{dq}{dt}$ . If  $p^2 = \frac{1}{LC}$  and initially the current  $X$  and charge  $q$  are zero, find the current in the circuit at time  $t$ .
- Calculate inverse Laplace transform of  $\frac{s^2}{(s^2+4)(s^2+9)}$  by using Convolution Method.
- Solve  $(D^2 - D - 2)y = 2 \log x + \frac{1}{x} + \frac{1}{x^2}$ .

## Section – II

**Q.5 Attempt any three of the following. 09**

- a) Solve  $pq = x^4 y^3 z^4$ .
- b) Solve  $pe^y = qe^x$
- c) Evaluate  $\oint \frac{e^{2z}}{(z-1)(z-2)} dz$  where  $c$  is the circle  $|z| = 3$
- d) Calculate  $Z\{f(k)\}$  and the region of convergence of  $f(k) = k2^k, k \geq 0$
- e) Calculate  $Z\{f(k)\}$  where  $f(k) = \left(\frac{1}{3}\right)^{|k|}$  for all  $k$ .

**Q.6 Attempt any three of the following. 09**

- a) Solve  $p(1 + q) = qz$ .
- b) Solve  $x(y - z)p + y(z - x)q = z(x - y)$
- c) Evaluate  $\oint \frac{z+2}{(z-3)(z-4)} dz$  where  $c$  is the circle  $|z| = 1$
- d) Calculate Z-Transform of  $f(x) = 2^k \cos\{3k + 2\}, k \geq 0$ .
- e) Calculate inverse Z-Transform of  $F(z) = \frac{1}{(z-5)^2}$  when  $|z| > 5$

**Q.7 Attempt any two of the following. 10**

- a) Evaluate  $\int_0^{2+i} z^2 dz$ 
  - i) Along the line  $x = 2y$
  - ii) along the real axis from  $z = 0$  to  $z = 2$  and then along the line parallel to the imaginary axis from  $z = 2$  to  $z = 2 + i$
  - iii) along the imaginary axis from  $z = 0$  to  $z = i$  and then along the line parallel to the real axis from  $z = i$  to  $z = 2 + i$  along the parabola  $2y^2 = x$ .
- b) Calculate inverse Z-Transform of  $F(z) = \frac{3z^2 - 18z + 26}{(z-2)(z-3)(z-4)}$  if region of Convergence is  $3 < |z| < 4$
- c) Use variable separable method to solve  $\frac{\partial z}{\partial x} = 4 \frac{\partial z}{\partial y}$  given  $z(0, y) = 8e^{-3y}$

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Set **R**

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Engineering Mathematics – III (BTN07301)**

Day & Date: Monday, 13-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Use of non-programmable calculator is allowed.

## Section – I

**Q.2 Attempt any Three of the following. 09**

- Solve  $(D^3 + 3D^2 + 3D + 1)y = e^{-x}$
- Solve  $(D^3 + D)y = \cos x$ .
- Solve  $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x$
- Calculate  $L\{te^{-4t} \sin 3t\}$
- Calculate  $L\left\{\int_0^t u \cdot e^{-4u} \sin 5u \, du\right\}$

**Q.3 Attempt any Three of the following. 09**

- Solve  $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = e^{e^x}$
- Solve  $(D^2 - 2D + 1)y = x \cdot e^x \sin x$ .
- Solve  $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} + y = 2 \sin(\log(1 + x))$
- Evaluate  $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$
- Find the Laplace Transform of  $(1 + 2t - 3t^2 + 4t^3)H(t - 3)$

**Q.4 Attempt any Two of the following. 10**

- An e.m.f.  $E \sin pt$  is applied at  $t = 0$  to a circuit containing a condenser  $C$  and inductance  $L$  in series. The current  $X$  satisfies the equation  $L \frac{dx}{dt} + \frac{1}{C} \int X \, dt = E \sin pt$ , where  $X = \frac{dq}{dt}$ . If  $p^2 = \frac{1}{LC}$  and initially the current  $X$  and charge  $q$  are zero, find the current in the circuit at time  $t$ .
- Calculate inverse Laplace transform of  $\frac{s^2}{(s^2+4)(s^2+9)}$  by using Convolution Method.
- Solve  $(D^2 - D - 2)y = 2 \log x + \frac{1}{x} + \frac{1}{x^2}$ .

## Section – II

**Q.5 Attempt any three of the following. 09**

- Solve  $pq = x^4 y^3 z^4$ .
- Solve  $pe^y = qe^x$
- Evaluate  $\oint \frac{e^{2z}}{(z-1)(z-2)} dz$  where  $c$  is the circle  $|z| = 3$
- Calculate  $Z\{f(k)\}$  and the region of convergence of  $f(k) = k2^k, k \geq 0$
- Calculate  $Z\{f(k)\}$  where  $f(k) = \left(\frac{1}{3}\right)^{|k|}$  for all  $k$ .

**Q.6 Attempt any three of the following. 09**

- Solve  $p(1+q) = qz$ .
- Solve  $x(y-z)p + y(z-x)q = z(x-y)$
- Evaluate  $\oint \frac{z+2}{(z-3)(z-4)} dz$  where  $c$  is the circle  $|z| = 1$
- Calculate Z-Transform of  $f(x) = 2^k \cos\{3k+2\}, k \geq 0$ .
- Calculate inverse Z-Transform of  $F(z) = \frac{1}{(z-5)^2}$  when  $|z| > 5$

**Q.7 Attempt any two of the following. 10**

- Evaluate  $\int_0^{2+i} z^2 dz$ 
  - Along the line  $x = 2y$
  - along the real axis from  $z = 0$  to  $z = 2$  and then along the line parallel to the imaginary axis from  $z = 2$  to  $z = 2 + i$
  - along the imaginary axis from  $z = 0$  to  $z = i$  and then along the line parallel to the real axis from  $z = i$  to  $z = 2 + i$  along the parabola  $2y^2 = x$ .
- Calculate inverse Z-Transform of  $F(z) = \frac{3z^2 - 18z + 26}{(z-2)(z-3)(z-4)}$  if region of Convergence is  $3 < |z| < 4$
- Use variable separable method to solve  $\frac{\partial z}{\partial x} = 4 \frac{\partial z}{\partial y}$  given  $z(0, y) = 8e^{-3y}$

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Set **S**

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Engineering Mathematics – III (BTN07301)**

Day &amp; Date: Monday, 13-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Use of non-programmable calculator is allowed.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Multiple Choice Questions.****14**

- 1) If  $L[f(t)] = \phi(s)$ , then  $L[f(at)]$  is \_\_\_\_\_.
  - a)  $\phi\left(\frac{s}{a}\right)$
  - b)  $\frac{1}{s}\phi\left(\frac{s}{a}\right)$
  - c)  $\frac{1}{a}\phi\left(\frac{s}{a}\right)$
  - d)  $a.\phi\left(\frac{s}{a}\right)$
- 2) The Laplace transform of  $t \cosh t$  is \_\_\_\_\_.
  - a)  $\frac{s^2 - 1}{(s^2 + 1)^2}$
  - b)  $-\frac{s^2 - 1}{(s + 1)^2}$
  - c)  $\frac{s^2 + 1}{(s^2 - 1)^2}$
  - d)  $-\frac{s^2 + 1}{(s^2 - 1)^2}$
- 3) The value of  $\int_c \frac{(z+6) dz}{z^2-4}$  where  $c$  is the circle  $|z - 2| = 1$  is \_\_\_\_\_.
  - a)  $2\pi$
  - b)  $4\pi i$
  - c)  $2\pi i$
  - d)  $4\pi$
- 4)  $\int_c (y - x - 3x^2 i) dz$  where  $c$  is the straight line from  $z = 0$  to  $z = 1 + i$  is \_\_\_\_\_.
  - a)  $1 + i$
  - b)  $1 - i$
  - c)  $i$
  - d)  $-i$
- 5) If  $Z\{f(k)\} = F(z)$ , then  $Z\{kf(k)\} =$  \_\_\_\_\_.
  - a)  $\frac{dF(z)}{dz}$
  - b)  $-\frac{dF(z)}{dz}$
  - c)  $z \frac{dF(z)}{dz}$
  - d)  $-z \frac{dF(z)}{dz}$
- 6) If  $\delta(k) = \begin{cases} 1, & k = 0 \\ 0, & \text{otherwise} \end{cases}$  then  $Z\{\delta(k)\} =$  \_\_\_\_\_.
  - a)  $0$
  - b)  $1$
  - c)  $Z$
  - d)  $1/z$



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Set **S**

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Engineering Mathematics – III (BTN07301)**

Day & Date: Monday, 13-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Use of non-programmable calculator is allowed.

## Section – I

**Q.2 Attempt any Three of the following. 09**

- Solve  $(D^3 + 3D^2 + 3D + 1)y = e^{-x}$
- Solve  $(D^3 + D)y = \cos x$ .
- Solve  $x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 4y = 2x$
- Calculate  $L\{te^{-4t} \sin 3t\}$
- Calculate  $L\left\{\int_0^t u \cdot e^{-4u} \sin 5u \, du\right\}$

**Q.3 Attempt any Three of the following. 09**

- Solve  $\frac{d^2y}{dx^2} + 3 \frac{dy}{dx} + 2y = e^{e^x}$
- Solve  $(D^2 - 2D + 1)y = x \cdot e^x \sin x$ .
- Solve  $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} + y = 2 \sin(\log(1 + x))$
- Evaluate  $\int_0^\infty \frac{\cos at - \cos bt}{t} dt$
- Find the Laplace Transform of  $(1 + 2t - 3t^2 + 4t^3)H(t - 3)$

**Q.4 Attempt any Two of the following. 10**

- An e.m.f.  $E \sin pt$  is applied at  $t = 0$  to a circuit containing a condenser  $C$  and inductance  $L$  in series. The current  $X$  satisfies the equation  $L \frac{dx}{dt} + \frac{1}{c} \int X \, dt = E \sin pt$ , where  $X = \frac{dq}{dt}$ . If  $p^2 = \frac{1}{LC}$  and initially the current  $X$  and charge  $q$  are zero, find the current in the circuit at time  $t$ .
- Calculate inverse Laplace transform of  $\frac{s^2}{(s^2+4)(s^2+9)}$  by using Convolution Method.
- Solve  $(D^2 - D - 2)y = 2 \log x + \frac{1}{x} + \frac{1}{x^2}$ .

## Section – II

**Q.5 Attempt any three of the following. 09**

- Solve  $pq = x^4 y^3 z^4$ .
- Solve  $pe^y = qe^x$
- Evaluate  $\oint \frac{e^{2z}}{(z-1)(z-2)} dz$  where  $c$  is the circle  $|z| = 3$
- Calculate  $Z\{f(k)\}$  and the region of convergence of  $f(k) = k2^k, k \geq 0$
- Calculate  $Z\{f(k)\}$  where  $f(k) = \left(\frac{1}{3}\right)^{|k|}$  for all  $k$ .

**Q.6 Attempt any three of the following. 09**

- Solve  $p(1+q) = qz$ .
- Solve  $x(y-z)p + y(z-x)q = z(x-y)$
- Evaluate  $\oint \frac{z+2}{(z-3)(z-4)} dz$  where  $c$  is the circle  $|z| = 1$
- Calculate Z-Transform of  $f(x) = 2^k \cos\{3k+2\}, k \geq 0$ .
- Calculate inverse Z-Transform of  $F(z) = \frac{1}{(z-5)^2}$  when  $|z| > 5$

**Q.7 Attempt any two of the following. 10**

- Evaluate  $\int_0^{2+i} z^2 dz$ 
  - Along the line  $x = 2y$
  - along the real axis from  $z = 0$  to  $z = 2$  and then along the line parallel to the imaginary axis from  $z = 2$  to  $z = 2 + i$
  - along the imaginary axis from  $z = 0$  to  $z = i$  and then along the line parallel to the real axis from  $z = i$  to  $z = 2 + i$  along the parabola  $2y^2 = x$ .
- Calculate inverse Z-Transform of  $F(z) = \frac{3z^2 - 18z + 26}{(z-2)(z-3)(z-4)}$  if region of Convergence is  $3 < |z| < 4$
- Use variable separable method to solve  $\frac{\partial z}{\partial x} = 4 \frac{\partial z}{\partial y}$  given  $z(0, y) = 8e^{-3y}$

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Set **P**

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines - I (BTN07302)**

Day & Date: Tuesday, 14-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.  
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary.  
 5) Draw neat diagrams wherever necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternatives from the options.**

**14**

- 1) Armature reaction of an unsaturated D.C. machine is \_\_\_\_\_.  
 a) cross magnetizing                      b) Demagnetizing  
 c) Magnetizing                                d) none of above
- 2) In a D.C. generator \_\_\_\_\_.  
 a) external resistance = internal characteristic - armature reaction  
 b) Internal characteristic = magnetization characteristic - ohmic drop  
 c) External characteristic = magnetization characteristic - ohmic drop - armature reaction  
 d) Magnetization characteristic = external characteristic
- 3) A laboratory group was working with a set of 3-hp shunt DC motor. But there was a mistake that it was fused with a 0.3A fuse instead 3A fuse. Then it was started \_\_\_\_\_.  
 a) a flash occurred instantly  
 b) it ran for 3s and fuse was blown  
 c) it ran normal  
 d) none of the mentioned
- 4) Small DC motors have best speed control by \_\_\_\_\_.  
 a) armature voltage control              b) field resistance control  
 c) any of the methods                      d) none of the mentioned
- 5) Iron losses in a D. C. machine are independent of variation in \_\_\_\_\_.  
 a) speed                                          b) load  
 c) Voltage                                        d) speed and voltage
- 6) In the Hopkinson's test on two DC machines. Machine A has field current of 1.4A and B has field current of 1.3A. Which machine acts as generator?  
 a) B                                                b) A  
 c) A, B                                            d) none of the mentioned



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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines - I (BTN07302)**

Day & Date: Tuesday, 14-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicates full marks.  
 3) Assume suitable data if necessary.  
 4) Draw neat diagrams whenever necessary.

**Section – I**

**Q.2 Attempt any four of the following:** **16**

- a) Why DC series motor is not started without load? Explain with the help of equations and its characteristics.
- b) Compare lap winding and wave winding.
- c) Explain with neat sketch Swinburne's test on DC machine.
- d) A series generator delivers a current of 100 A at 250 V. Its armature and series field resistances are  $0.1 \Omega$  and  $0.055 \Omega$  respectively. Find:
  - i) Armature current
  - ii) Generated e.m.f.
- e) A 230 V de shunt motor has an armature resistance of  $0.5 \Omega$  and a field resistance of  $76 \frac{2}{3} \Omega$ . The motor draws a line current of 13 A while running light at 1000 r.p.m. At a certain load, the field circuit resistance is increased by  $38 \frac{1}{3} \Omega$ . What is the new speed of the motor if the line current at this load is 42 A?

**Q.3 Attempt the following:** **12**

- a) Explain commutation and what are the methods to improve the commutation.
- b) A 100KW, 500V DC shunt generator was runs as motor on no load at rates voltage and speed. The total current taken was 9.5 A including the shunt field current of 2.5 A. The resistance of armature circuit is  $0.1 \Omega$ . Calculate the efficiency of generator at
  - i) full-load
  - ii) half the full load

**OR**

- c) The brake test on a DC shunt motor gave the following results: tensions on two sides of the brake were 10 kg and 35 kg, radius of pully 20 cm, speed 950 rpm, Input current was 30 A at 200V. Find:
  - i) Output torque
  - ii) Output power
  - iii) Input power
  - iv) Efficiency

**Section – II**

- Q.4 Attempt any four of the following:** **16**
- a) Explain with neat sketch construction of a transformer.
  - b) Explain with phasor diagram no load operation of a transformer.
  - c) A single-phase transformer with a ratio 5: 1 has primary resistance of 0.4 ohm and reactance of 1.2 ohm and the secondary resistance of 0.01 and reactance of 0.04 ohm. Determine the percentage regulation when delivering 125 A at 600 V at 0.8 p.f. leading.
  - d) Explain the operation of open delta connection of transformer.
  - e) Explain the working principle and construction of an auto-transformer
- Q.5 Attempt any two of the following:** **12**
- a) What are the different conditions for parallel operation of transformer? Also explain necessity and operation of parallel connected transformer.
  - b) Open-circuit and short-circuit tests on a 4 kVA, 200/400 V, 50 Hz, one-phase transformer gave the following test:  
O.C. test: 200 V, 1 A, 100 W (on L.V. side)  
S.C. test: 15 V, 10 A, 85 W (with primary short-circuited)
    - i) Calculate equivalent circuit parameters referred to primary
    - ii) Draw the equivalent circuit referred to primary
  - c) Explain the following connections of three-phase transformers:
    - i) Star-star
    - ii) Delta-delta, giving the merits of each one of them

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Day & Date: Tuesday, 14-05-2024  
Time: 03:00 PM To 06:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data if necessary.
- 5) Draw neat diagrams wherever necessary.

Marks: 14

14

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- 7) Transformer has negative voltage regulation when its load power factor is \_\_\_\_.
- a) zero
  - b) unity
  - c) leading
  - d) lagging
- 8) Armature reaction of an unsaturated D.C. machine is \_\_\_\_.
- a) cross magnetizing
  - b) Demagnetizing
  - c) Magnetizing
  - d) none of above
- 9) In a D.C. generator \_\_\_\_.
- a) external resistance = internal characteristic - armature reaction
  - b) Internal characteristic = magnetization characteristic - ohmic drop
  - c) External characteristic = magnetization characteristic - ohmic drop - armature reaction
  - d) Magnetization characteristic = external characteristic
- 10) A laboratory group was working with a set of 3-hp shunt DC motor. But there was a mistake that it was fused with a 0.3A fuse instead 3A fuse. Then it was started \_\_\_\_.
- a) a flash occurred instantly
  - b) it ran for 3s and fuse was blown
  - c) it ran normal
  - d) none of the mentioned
- 11) Small DC motors have best speed control by \_\_\_\_.
- a) armature voltage control
  - b) field resistance control
  - c) any of the methods
  - d) none of the mentioned
- 12) Iron losses in a D. C. machine are independent of variation in \_\_\_\_.
- a) speed
  - b) load
  - c) Voltage
  - d) speed and voltage
- 13) In the Hopkinson's test on two DC machines. Machine A has field current of 1.4A and B has field current of 1.3A. Which machine acts as generator?
- a) B
  - b) A
  - c) A, B
  - d) none of the mentioned
- 14) While performing Swinburne's test, the iron losses are assumed to be \_\_\_\_.
- a) Constant
  - b) Absent
  - c) Variable
  - d) None of these

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines - I (BTN07302)**

Day & Date: Tuesday, 14-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicates full marks.  
 3) Assume suitable data if necessary.  
 4) Draw neat diagrams whenever necessary.

**Section – I**

**Q.2 Attempt any four of the following:** **16**

- a) Why DC series motor is not started without load? Explain with the help of equations and its characteristics.
- b) Compare lap winding and wave winding.
- c) Explain with neat sketch Swinburne's test on DC machine.
- d) A series generator delivers a current of 100 A at 250 V. Its armature and series field resistances are  $0.1 \Omega$  and  $0.055 \Omega$  respectively. Find:
  - i) Armature current
  - ii) Generated e.m.f.
- e) A 230 V de shunt motor has an armature resistance of  $0.5 \Omega$  and a field resistance of  $76 \frac{2}{3} \Omega$ . The motor draws a line current of 13 A while running light at 1000 r.p.m. At a certain load, the field circuit resistance is increased by  $38 \frac{1}{3} \Omega$ . What is the new speed of the motor if the line current at this load is 42 A?

**Q.3 Attempt the following:** **12**

- a) Explain commutation and what are the methods to improve the commutation.
- b) A 100KW, 500V DC shunt generator was runs as motor on no load at rates voltage and speed. The total current taken was 9.5 A including the shunt field current of 2.5 A. The resistance of armature circuit is  $0.1 \Omega$ . Calculate the efficiency of generator at
  - i) full-load
  - ii) half the full load

**OR**

- c) The brake test on a DC shunt motor gave the following results: tensions on two sides of the brake were 10 kg and 35 kg, radius of pully 20 cm, speed 950 rpm, Input current was 30 A at 200V. Find:
  - i) Output torque
  - ii) Output power
  - iii) Input power
  - iv) Efficiency

**Section – II**

- Q.4 Attempt any four of the following: 16**
- a) Explain with neat sketch construction of a transformer.
  - b) Explain with phasor diagram no load operation of a transformer.
  - c) A single-phase transformer with a ratio 5: 1 has primary resistance of 0.4 ohm and reactance of 1.2 ohm and the secondary resistance of 0.01 and reactance of 0.04 ohm. Determine the percentage regulation when delivering 125 A at 600 V at 0.8 p.f. leading.
  - d) Explain the operation of open delta connection of transformer.
  - e) Explain the working principle and construction of an auto-transformer
- Q.5 Attempt any two of the following: 12**
- a) What are the different conditions for parallel operation of transformer? Also explain necessity and operation of parallel connected transformer.
  - b) Open-circuit and short-circuit tests on a 4 kVA, 200/400 V, 50 Hz, one-phase transformer gave the following test:  
O.C. test: 200 V, 1 A, 100 W (on L.V. side)  
S.C. test: 15 V, 10 A, 85 W (with primary short-circuited)
    - i) Calculate equivalent circuit parameters referred to primary
    - ii) Draw the equivalent circuit referred to primary
  - c) Explain the following connections of three-phase transformers:
    - i) Star-star
    - ii) Delta-delta, giving the merits of each one of them

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines - I (BTN07302)**

Day & Date: Tuesday, 14-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.  
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary.  
 5) Draw neat diagrams wherever necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternatives from the options.**

**14**

- 1) The kVA rating of an ordinary 2-winding transformer is increased when connected as an autotransformer because \_\_\_\_\_.  
 a) transformation ratio is increased  
 b) secondary voltage is increased  
 c) energy is transferred both inductively and conductivity  
 d) secondary current is increased
- 2) As compared to  $\Delta - \Delta$  bank, the capacity of the V - V bank of transformers is \_\_\_\_\_ percent.  
 a) 57.7  
 b) 66.7  
 c) 50  
 d) 86.6
- 3) In a three-phase Y-Y transformer connection, neutral is fundamental to the \_\_\_\_\_.  
 a) suppression of harmonics  
 b) passage of unbalanced currents due to unbalanced loads  
 c) provision of dual electric service  
 d) balancing of phase voltages with respect to line voltages
- 4) Transformer has negative voltage regulation when its load power factor is \_\_\_\_\_.  
 a) zero  
 b) unity  
 c) leading  
 d) lagging
- 5) Armature reaction of an unsaturated D.C. machine is \_\_\_\_\_.  
 a) cross magnetizing  
 b) Demagnetizing  
 c) Magnetizing  
 d) none of above
- 6) In a D.C. generator \_\_\_\_\_.  
 a) external resistance = internal characteristic - armature reaction  
 b) Internal characteristic = magnetization characteristic - ohmic drop  
 c) External characteristic = magnetization characteristic - ohmic drop - armature reaction  
 d) Magnetization characteristic = external characteristic

- 7) A laboratory group was working with a set of 3-hp shunt DC motor. But there was a mistake that it was fused with a 0.3A fuse instead 3A fuse. Then it was started \_\_\_\_\_.  
a) a flash occurred instantly  
b) it ran for 3s and fuse was blown  
c) it ran normal  
d) none of the mentioned
- 8) Small DC motors have best speed control by \_\_\_\_\_.  
a) armature voltage control                      b) field resistance control  
c) any of the methods                              d) none of the mentioned
- 9) Iron losses in a D. C. machine are independent of variation in \_\_\_\_\_.  
a) speed                                                      b) load  
c) Voltage                                                  d) speed and voltage
- 10) In the Hopkinson's test on two DC machines. Machine A has field current of 1.4A and B has field current of 1.3A. Which machine acts as generator?  
a) B                                                              b) A  
c) A, B                                                        d) none of the mentioned
- 11) While performing Swinburne's test, the iron losses are assumed to be \_\_\_\_\_.  
a) Constant                                                  b) Absent  
c) Variable                                                  d) None of these
- 12) Which of the following is not basic element of a transformer?  
a) Core                                                              b) Primary winding  
c) Secondary winding                                  d) Mutual flux
- 13) If Cu loss of a transformer at 7/8th full load is 4900 W, then its full-load Cu loss would be \_\_\_\_\_ watt.  
a) 5600                                                              b) 6400  
c) 375                                                                d) 429
- 14) No load test on a transformer is carried out to determine \_\_\_\_\_.  
a) Copper loss  
b) Magnetizing current  
c) Magnetizing current & No load loss  
d) Efficiency of the transformer

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines - I (BTN07302)**

Day & Date: Tuesday, 14-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicates full marks.  
 3) Assume suitable data if necessary.  
 4) Draw neat diagrams whenever necessary.

**Section – I**

**Q.2 Attempt any four of the following:**

**16**

- Why DC series motor is not started without load? Explain with the help of equations and its characteristics.
- Compare lap winding and wave winding.
- Explain with neat sketch Swinburne's test on DC machine.
- A series generator delivers a current of 100 A at 250 V. Its armature and series field resistances are  $0.1 \Omega$  and  $0.055 \Omega$  respectively. Find:
  - Armature current
  - Generated e.m.f.
- A 230 V de shunt motor has an armature resistance of  $0.5 \Omega$  and a field resistance of  $76 \frac{2}{3} \Omega$ . The motor draws a line current of 13 A while running light at 1000 r.p.m. At a certain load, the field circuit resistance is increased by  $38 \frac{1}{3} \Omega$ . What is the new speed of the motor if the line current at this load is 42 A?

**Q.3 Attempt the following:**

**12**

- Explain commutation and what are the methods to improve the commutation.
- A 100KW, 500V DC shunt generator was runs as motor on no load at rates voltage and speed. The total current taken was 9.5 A including the shunt field current of 2.5 A. The resistance of armature circuit is  $0.1 \Omega$ . Calculate the efficiency of generator at
  - full-load
  - half the full load

**OR**

- The brake test on a DC shunt motor gave the following results: tensions on two sides of the brake were 10 kg and 35 kg, radius of pully 20 cm, speed 950 rpm, Input current was 30 A at 200V. Find:
  - Output torque
  - Output power
  - Input power
  - Efficiency

**Section – II**

**Q.4 Attempt any four of the following: 16**

- a) Explain with neat sketch construction of a transformer.
- b) Explain with phasor diagram no load operation of a transformer.
- c) A single-phase transformer with a ratio 5: 1 has primary resistance of 0.4 ohm and reactance of 1.2 ohm and the secondary resistance of 0.01 and reactance of 0.04 ohm. Determine the percentage regulation when delivering 125 A at 600 V at 0.8 p.f. leading.
- d) Explain the operation of open delta connection of transformer.
- e) Explain the working principle and construction of an auto-transformer

**Q.5 Attempt any two of the following: 12**

- a) What are the different conditions for parallel operation of transformer? Also explain necessity and operation of parallel connected transformer.
- b) Open-circuit and short-circuit tests on a 4 kVA, 200/400 V, 50 Hz, one-phase transformer gave the following test:  
O.C. test: 200 V, 1 A, 100 W (on L.V. side)  
S.C. test: 15 V, 10 A, 85 W (with primary short-circuited)
  - i) Calculate equivalent circuit parameters referred to primary
  - ii) Draw the equivalent circuit referred to primary
- c) Explain the following connections of three-phase transformers:
  - i) Star-star
  - ii) Delta-delta, giving the merits of each one of them

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines - I (BTN07302)**

Day & Date: Tuesday, 14-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book Page No.3 (starting page of the Answer Book). Each question carry one mark.  
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
 3) Figures to the right indicates full marks.  
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 5) Draw neat diagrams wherever necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternatives from the options. 14**

- 1) In the Hopkinson's test on two DC machines. Machine A has field current of 1.4A and B has field current of 1.3A. Which machine acts as generator?
  - a) B
  - b) A
  - c) A, B
  - d) none of the mentioned
- 2) While performing Swinburne's test, the iron losses are assumed to be \_\_\_\_\_.
  - a) Constant
  - b) Absent
  - c) Variable
  - d) None of these
- 3) Which of the following is not basic element of a transformer?
  - a) Core
  - b) Primary winding
  - c) Secondary winding
  - d) Mutual flux
- 4) If Cu loss of a transformer at 7/8th full load is 4900 W, then its full-load Cu loss would be \_\_\_\_\_ watt.
  - a) 5600
  - b) 6400
  - c) 375
  - d) 429
- 5) No load test on a transformer is carried out to determine \_\_\_\_\_.
  - a) Copper loss
  - b) Magnetizing current
  - c) Magnetizing current & No load loss
  - d) Efficiency of the transformer
- 6) The kVA rating of an ordinary 2-winding transformer is increased when connected as an autotransformer because \_\_\_\_\_.
  - a) transformation ratio is increased
  - b) secondary voltage is increased
  - c) energy is transferred both inductively and conductivity
  - d) secondary current is increased





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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**

**ELECTRICAL ENGINEERING**

**Electrical Machines - I (BTN07302)**

Day & Date: Tuesday, 14-05-2024  
Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
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4) Draw neat diagrams whenever necessary.

**Section – I**

**Q.2 Attempt any four of the following:**

**16**

- Why DC series motor is not started without load? Explain with the help of equations and its characteristics.
- Compare lap winding and wave winding.
- Explain with neat sketch Swinburne's test on DC machine.
- A series generator delivers a current of 100 A at 250 V. Its armature and series field resistances are  $0.1 \Omega$  and  $0.055 \Omega$  respectively. Find:
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- A 230 V de shunt motor has an armature resistance of  $0.5 \Omega$  and a field resistance of  $76 \frac{2}{3} \Omega$ . The motor draws a line current of 13 A while running light at 1000 r.p.m. At a certain load, the field circuit resistance is increased by  $38 \frac{1}{3} \Omega$ . What is the new speed of the motor if the line current at this load is 42 A?

**Q.3 Attempt the following:**

**12**

- Explain commutation and what are the methods to improve the commutation.
- A 100KW, 500V DC shunt generator was runs as motor on no load at rates voltage and speed. The total current taken was 9.5 A including the shunt field current of 2.5 A. The resistance of armature circuit is  $0.1 \Omega$ . Calculate the efficiency of generator at
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**OR**

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  - Output torque
  - Output power
  - Input power
  - Efficiency

**Section – II**

- Q.4 Attempt any four of the following:** **16**
- a) Explain with neat sketch construction of a transformer.
  - b) Explain with phasor diagram no load operation of a transformer.
  - c) A single-phase transformer with a ratio 5: 1 has primary resistance of 0.4 ohm and reactance of 1.2 ohm and the secondary resistance of 0.01 and reactance of 0.04 ohm. Determine the percentage regulation when delivering 125 A at 600 V at 0.8 p.f. leading.
  - d) Explain the operation of open delta connection of transformer.
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- Q.5 Attempt any two of the following:** **12**
- a) What are the different conditions for parallel operation of transformer? Also explain necessity and operation of parallel connected transformer.
  - b) Open-circuit and short-circuit tests on a 4 kVA, 200/400 V, 50 Hz, one-phase transformer gave the following test:  
O.C. test: 200 V, 1 A, 100 W (on L.V. side)  
S.C. test: 15 V, 10 A, 85 W (with primary short-circuited)
    - i) Calculate equivalent circuit parameters referred to primary
    - ii) Draw the equivalent circuit referred to primary
  - c) Explain the following connections of three-phase transformers:
    - i) Star-star
    - ii) Delta-delta, giving the merits of each one of them

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## Max. Marks: 70

Marks: 14

## 14

- Page 1 of 12

- 9) Feeder is designed mainly from the point of view of \_\_\_\_\_.  
a) Its current carrying capacity  
b) Voltage drop in it  
c) Operating voltage  
d) Operating Frequency
- 10) A 3 phase 4 wire system is commonly used for \_\_\_\_\_.  
a) Primary distribution  
b) Secondary distribution  
c) Primary transmission  
d) Secondary transmission
- 11) The voltage of the single phase supply to residential consumers is \_\_\_\_\_.  
a) 110 V  
b) 210 V  
c) 230 V  
d) 400 V
- 12) High voltage transmission lines use \_\_\_\_\_.  
a) suspension insulators  
b) pin insulators  
c) both (a) and (b)  
d) none of the above
- 13) Overhead lines generally use \_\_\_\_\_.  
a) A.C.S.R. conductors  
b) Copper conductors  
c) Aluminum conductors  
d) Any of the above
- 14) Voltage across the string is \_\_\_\_\_ times the line voltage.  
a)  $\sqrt{3}$   
b)  $\sqrt{2}$   
c)  $1/\sqrt{3}$   
d)  $1/\sqrt{2}$

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System I (BTN07304)**

Day & Date: Wednesday, 15-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data wherever necessary.

**Section – I**

**Q.2 Solve any four.** **16**

- a) Explain the following terms.
  - i) Maximum demand
  - ii) Demand factor
  - iii) Plant capacity factor
  - iv) Load factor
- b) What factors are taken into account while selecting the site for a steam power station?
- c) Explain with a neat sketch the various parts of a nuclear reactor.
- d) Draw the Schematic Arrangement of Hydro-electric Power Station and explain.
- e) Explain Base Load and Peak Load on Power Station.

**Q.3 Solve any two.** **12**

- a) What are the different types of loads? Explain.
- b) A generating station has a connected load of 40 MW and a maximum demand of 20MW: the units generated being  $60 \times 10^6$ . Calculate
  - i) the demand factor
  - ii) the load factor, [(i) 0.5 (ii) 34.25%]
- c) What do you understand by Tariff? Discuss the objectives of Tariff.

**Section – II**

**Q.4 Solve any four.** **16**

- a) What are the methods improving String Efficiency?
- b) Explain Typical AC Power Supply Scheme.
- c) Derive the equation for conductor material required in 2-wire d.c. system with Mid-point earthed.
- d) What are the different types of commonly used conductor materials?
- e) Compare between the DC and AC Transmission systems.

**Q.5 Solve any two.** **12**

- a) State and explain Kelvin's law to determine the economic size of Transmission conductor.
- b) In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find,
  - i) the distribution of voltage over 3 insulators and
  - ii) string efficiency
- c) Derive the equation for conductor material required in Single phase, 2-wire a.c. system. Compare with 2 wire DC system.

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System I (BTN07304)**

Day & Date: Wednesday, 15-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternative from options.**

**14**

- 1) Which of the following part of thermal power plant causes maximum energy losses?
 

|               |                           |
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| a) Alternator | b) Ash and unburnt carbon |
| c) Boiler     | d) Condenser              |
- 2) Feeder is designed mainly from the point of view of \_\_\_\_\_.
 

|                                  |
|----------------------------------|
| a) Its current carrying capacity |
| b) Voltage drop in it            |
| c) Operating voltage             |
| d) Operating Frequency           |
- 3) A 3 phase 4 wire system is commonly used for \_\_\_\_\_.
 

|                         |                           |
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| a) Primary distribution | b) Secondary distribution |
| c) Primary transmission | d) Secondary transmission |
- 4) The voltage of the single phase supply to residential consumers is \_\_\_\_\_.
 

|          |          |
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| a) 110 V | b) 210 V |
| c) 230 V | d) 400 V |
- 5) High voltage transmission lines use \_\_\_\_\_.
 

|                          |                      |
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| a) suspension insulators | b) pin insulators    |
| c) both (a) and (b)      | d) none of the above |
- 6) Overhead lines generally use \_\_\_\_\_.
 

|                        |                      |
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| a) A.C.S.R. conductors | b) Copper conductors |
| c) Aluminum conductors | d) Any of the above  |
- 7) Voltage across the string is \_\_\_\_\_ times the line voltage.
 

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| a) $\sqrt{3}$   | b) $\sqrt{2}$   |
| c) $1/\sqrt{3}$ | d) $1/\sqrt{2}$ |
- 8) Electric power supply system means \_\_\_\_\_.
 

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| a) Generation   | b) Transmission |
| c) Distribution | d) All of above |

- 9) Which of following generating plants has the minimum operating cost?
  - a) Diesel plant
  - b) Hydroelectric plant
  - c) Steam plant
  - d) Nuclear plant
- 10) A load curve is a plot of \_\_\_\_\_.
  - a) Load versus generation capacity
  - b) Load versus time
  - c) Load versus current
  - d) Load versus cost of power
- 11) Which type of insulator is used on 132 KV line \_\_\_\_\_.
  - a) Pin type
  - b) Disc type
  - c) Shackle type
  - d) Pin and shackle type
- 12) Which tariff is most ideal tariff for the consumer?
  - a) Two part tariff
  - b) Three part tariff
  - c) Both (a) and (b)
  - d) None of the above
- 13) Which type of system is generally adopted for the generation and transmission of electrical power?
  - a) 3 phase 4 wire
  - b) 2 phase 3 wire
  - c) 3 phase 3 wire
  - d) None of these
- 14) Area under the daily load curve divided by 24 hours gives \_\_\_\_\_.
  - a) Average load
  - b) Maximum demand
  - c) Units generated
  - d) Peak load



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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System I (BTN07304)**

Day & Date: Wednesday, 15-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
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**Section – I**

**Q.2 Solve any four.** **16**

- a) Explain the following terms.
  - i) Maximum demand
  - ii) Demand factor
  - iii) Plant capacity factor
  - iv) Load factor
- b) What factors are taken into account while selecting the site for a steam power station?
- c) Explain with a neat sketch the various parts of a nuclear reactor.
- d) Draw the Schematic Arrangement of Hydro-electric Power Station and explain.
- e) Explain Base Load and Peak Load on Power Station.

**Q.3 Solve any two.** **12**

- a) What are the different types of loads? Explain.
- b) A generating station has a connected load of 40 MW and a maximum demand of 20MW: the units generated being  $60 \times 10^6$ . Calculate
  - i) the demand factor
  - ii) the load factor, [(i) 0.5 (ii) 34.25%]
- c) What do you understand by Tariff? Discuss the objectives of Tariff.

**Section – II**

**Q.4 Solve any four.** **16**

- a) What are the methods improving String Efficiency?
- b) Explain Typical AC Power Supply Scheme.
- c) Derive the equation for conductor material required in 2-wire d.c. system with Mid-point earthed.
- d) What are the different types of commonly used conductor materials?
- e) Compare between the DC and AC Transmission systems.

**Q.5 Solve any two.** **12**

- a) State and explain Kelvin's law to determine the economic size of Transmission conductor.
- b) In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find,
  - i) the distribution of voltage over 3 insulators and
  - ii) string efficiency
- c) Derive the equation for conductor material required in Single phase, 2-wire a.c. system. Compare with 2 wire DC system.

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- 10)** Which type of system is generally adopted for the generation and transmission of electrical power?
- |                   |                   |
|-------------------|-------------------|
| a) 3 phase 4 wire | b) 2 phase 3 wire |
| c) 3 phase 3 wire | d) None of these  |
- 11)** Area under the daily load curve divided by 24 hours gives \_\_\_\_.
- |                    |                   |
|--------------------|-------------------|
| a) Average load    | b) Maximum demand |
| c) Units generated | d) Peak load      |
- 12)** Which of the following part of thermal power plant causes maximum energy losses?
- |               |                           |
|---------------|---------------------------|
| a) Alternator | b) Ash and unburnt carbon |
| c) Boiler     | d) Condenser              |
- 13)** Feeder is designed mainly from the point of view of \_\_\_\_.
- |                                  |  |
|----------------------------------|--|
| a) Its current carrying capacity |  |
| b) Voltage drop in it            |  |
| c) Operating voltage             |  |
| d) Operating Frequency           |  |
- 14)** A 3 phase 4 wire system is commonly used for \_\_\_\_.
- |                         |                           |
|-------------------------|---------------------------|
| a) Primary distribution | b) Secondary distribution |
| c) Primary transmission | d) Secondary transmission |

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System I (BTN07304)**

Day & Date: Wednesday, 15-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data wherever necessary.

**Section – I**

**Q.2 Solve any four.** **16**

- a) Explain the following terms.
  - i) Maximum demand
  - ii) Demand factor
  - iii) Plant capacity factor
  - iv) Load factor
- b) What factors are taken into account while selecting the site for a steam power station?
- c) Explain with a neat sketch the various parts of a nuclear reactor.
- d) Draw the Schematic Arrangement of Hydro-electric Power Station and explain.
- e) Explain Base Load and Peak Load on Power Station.

**Q.3 Solve any two.** **12**

- a) What are the different types of loads? Explain.
- b) A generating station has a connected load of 40 MW and a maximum demand of 20MW: the units generated being  $60 \times 10^6$ . Calculate
  - i) the demand factor
  - ii) the load factor, [(i) 0.5 (ii) 34.25%]
- c) What do you understand by Tariff? Discuss the objectives of Tariff.

**Section – II**

**Q.4 Solve any four.** **16**

- a) What are the methods improving String Efficiency?
- b) Explain Typical AC Power Supply Scheme.
- c) Derive the equation for conductor material required in 2-wire d.c. system with Mid-point earthed.
- d) What are the different types of commonly used conductor materials?
- e) Compare between the DC and AC Transmission systems.

**Q.5 Solve any two.** **12**

- a) State and explain Kelvin's law to determine the economic size of Transmission conductor.
- b) In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find,
  - i) the distribution of voltage over 3 insulators and
  - ii) string efficiency
- c) Derive the equation for conductor material required in Single phase, 2-wire a.c. system. Compare with 2 wire DC system.

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**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System I (BTN07304)**

Day & Date: Wednesday, 15-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data if necessary.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternative from options.**

**14**

- 1) Which type of system is generally adopted for the generation and transmission of electrical power?
 

|                   |                   |
|-------------------|-------------------|
| a) 3 phase 4 wire | b) 2 phase 3 wire |
| c) 3 phase 3 wire | d) None of these  |
- 2) Area under the daily load curve divided by 24 hours gives \_\_\_\_\_.
 

|                    |                   |
|--------------------|-------------------|
| a) Average load    | b) Maximum demand |
| c) Units generated | d) Peak load      |
- 3) Which of the following part of thermal power plant causes maximum energy losses?
 

|               |                           |
|---------------|---------------------------|
| a) Alternator | b) Ash and unburnt carbon |
| c) Boiler     | d) Condenser              |
- 4) Feeder is designed mainly from the point of view of \_\_\_\_\_.
 

|                                  |
|----------------------------------|
| a) Its current carrying capacity |
| b) Voltage drop in it            |
| c) Operating voltage             |
| d) Operating Frequency           |
- 5) A 3 phase 4 wire system is commonly used for \_\_\_\_\_.
 

|                         |                           |
|-------------------------|---------------------------|
| a) Primary distribution | b) Secondary distribution |
| c) Primary transmission | d) Secondary transmission |
- 6) The voltage of the single phase supply to residential consumers is \_\_\_\_\_.
 

|          |          |
|----------|----------|
| a) 110 V | b) 210 V |
| c) 230 V | d) 400 V |
- 7) High voltage transmission lines use \_\_\_\_\_.
 

|                          |                      |
|--------------------------|----------------------|
| a) suspension insulators | b) pin insulators    |
| c) both (a) and (b)      | d) none of the above |
- 8) Overhead lines generally use \_\_\_\_\_.
 

|                        |                      |
|------------------------|----------------------|
| a) A.C.S.R. conductors | b) Copper conductors |
| c) Aluminum conductors | d) Any of the above  |



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Set **S**

**S.Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System I (BTN07304)**

Day & Date: Wednesday, 15-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data wherever necessary.

**Section – I**

**Q.2 Solve any four.** **16**

- a) Explain the following terms.
  - i) Maximum demand
  - ii) Demand factor
  - iii) Plant capacity factor
  - iv) Load factor
- b) What factors are taken into account while selecting the site for a steam power station?
- c) Explain with a neat sketch the various parts of a nuclear reactor.
- d) Draw the Schematic Arrangement of Hydro-electric Power Station and explain.
- e) Explain Base Load and Peak Load on Power Station.

**Q.3 Solve any two.** **12**

- a) What are the different types of loads? Explain.
- b) A generating station has a connected load of 40 MW and a maximum demand of 20MW: the units generated being  $60 \times 10^6$ . Calculate
  - i) the demand factor
  - ii) the load factor, [(i) 0.5 (ii) 34.25%]
- c) What do you understand by Tariff? Discuss the objectives of Tariff.

**Section – II**

**Q.4 Solve any four.** **16**

- a) What are the methods improving String Efficiency?
- b) Explain Typical AC Power Supply Scheme.
- c) Derive the equation for conductor material required in 2-wire d.c. system with Mid-point earthed.
- d) What are the different types of commonly used conductor materials?
- e) Compare between the DC and AC Transmission systems.

**Q.5 Solve any two.** **12**

- a) State and explain Kelvin's law to determine the economic size of Transmission conductor.
- b) In a 33 kV overhead line, there are three units in the string of insulators. If the capacitance between each insulator pin and earth is 11% of self-capacitance of each insulator, find,
  - i) the distribution of voltage over 3 insulators and
  - ii) string efficiency
- c) Derive the equation for conductor material required in Single phase, 2-wire a.c. system. Compare with 2 wire DC system.

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## ELECTRICAL ENGINEERING

# Electronic Devices and Circuits (BTN07305)

Max. Marks: 70

**Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no. 03 (Starting page of the Answer Book). Each question carries one mark.

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.

3) Figures to the right indicates full marks.

### MCQ/Objective Type Questions

Marks:14

14

- 1) In which mode of BJT operation are both junctions reverse biased \_\_\_\_\_.  
a) active  
b) saturation  
c) cut off  
d) reverse active
- 2) For an NPN transistor in normal bias \_\_\_\_\_.  
a) Only holes cross the collector junction  
b) Only majority carriers cross the collector junction  
c) The emitter junction has high resistance  
d) Emitter junction is forward biased and collector junction is reverse biased
- 3) The ideal value for stability factor for biasing circuit is \_\_\_\_\_.  
a) 1  
b) 5  
c) 0  
d) 100
- 4) In BJT base region is made very thin so that \_\_\_\_\_.  
a) recombination in base region is minimum  
b) electric field gradient in base is high  
c) base can be easily fabricated  
d) base can be easily biased
- 5) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region?  
a) About  $0^\circ$   
b)  $45^\circ$   
c) About  $90^\circ$   
d) None of the above
- 6) If temperature changes,  $h$  parameters of a transistor \_\_\_\_\_.  
a) May or may not change  
b) Do not change  
c) Also change  
d) None of the above
- 7) In an unregulated power supply, if load current increases, the output voltage \_\_\_\_\_.  
a) Remains the same  
b) Decreases  
c) Increases  
d) None of the above



- [illegible]

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**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**

**ELECTRICAL ENGINEERING**

**Electronic Devices and Circuits (BTN07305)**

Day & Date: Thursday, 16-05-2024

Max. Marks: 56

Time: 03:00 PM To 06:00 PM

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Answer the Following. (Any Four) 16**

- a) For amplifier application Q point is selected into center of load line justify & explain the statement.
- b) Explain the details effect of coupling capacitor on frequency response of CE amplifier.
- c) Derive the relation between  $\alpha$  &  $\beta$ , derive equation for  $\alpha$  &  $\beta$
- d) Explain neat diagram of DC load line of BJT? Write significance of load line.
- e) Define the terms related to small signal parameter of JFET-
  - i) DC drain to source resistance
  - ii) Amplification factor
  - iii) AC drain resistance
  - iv) Transconductance

**Q.3 Answer the Following. (Any Two) 12**

- a) Draw & Explain V-I characteristics of JFET, also draw & explain V-I characteristics for different value of  $V_{GS}$ .
- b) Design a single stage CE amplifier which has  $V_{CEQ} = 5V$ ,  $I_{CEQ} = 5\text{ mA}$ ,  $V_{CC} = 12V$ ,  $A_V = 100$ ,  $A_i = 150$ ,  $V_{BE} = 0.6V$ ,  $h_{ie} = 2.5\text{ k}\Omega$ ,  $s = 3$ ,  $R_L = 1\text{ k}\Omega$ .
- c) Determine the voltage gain, current gain, input resistance using hybrid model of BJT in a CE Amplifier?

**Section – II**

**Q.4 Answer the Following. (Any Four) 16**

- a) Draw the Circuit diagram of Full wave center tap rectifier with  $\pi$  filter. Explain.
- b) Explain crossover distortion in power amplifier with suitable diagram.
- c) Compare small signal and large signal amplifier.
- d) Explain what is feedback circuit? Explain how it provides feedback in amplifiers.
- e) Differentiate between negative and positive feedback amplifiers.

**Q.5 Answer the Following. (Any Two) 12**

- a) Design an unregulated power supply using capacitor filter, supply to give DC output voltage of 50V at 1K $\Omega$  load with ripple factor not exceeding 3%. Use two diode rectifiers.
- b) Explain the concept of critical inductance in LC filter with their derivation.
- c) Explain types of negative feedback with block diagram.

**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRICAL ENGINEERING**  
**Electronic Devices and Circuits (BTN07305)**

Max. Marks: 70

### MCQ/Objective Type Questions

Marks:14

14

- Page 4 of 12

- 9) For an NPN transistor in normal bias \_\_\_\_\_.  
a) Only holes cross the collector junction  
b) Only majority carriers cross the collector junction  
c) The emitter junction has high resistance  
d) Emitter junction is forward biased and collector junction is reverse biased
- 10) The ideal value for stability factor for biasing circuit is \_\_\_\_\_.  
a) 1  
b) 5  
c) 0  
d) 100
- 11) In BJT base region is made very thin so that \_\_\_\_\_.  
a) recombination in base region is minimum  
b) electric field gradient in base is high  
c) base can be easily fabricated  
d) base can be easily biased
- 12) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region?  
a) About  $0^\circ$   
b)  $45^\circ$   
c) About  $90^\circ$   
d) None of the above
- 13) If temperature changes,  $h$  parameters of a transistor \_\_\_\_\_.  
a) May or may not change  
b) Do not change  
c) Also change  
d) None of the above
- 14) In an unregulated power supply, if load current increases, the output voltage \_\_\_\_\_.  
a) Remains the same  
b) Decreases  
c) Increases  
d) None of the above

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**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRICAL ENGINEERING**  
**Electronic Devices and Circuits (BTN07305)**

Day & Date: Thursday, 16-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Answer the Following. (Any Four) 16**

- For amplifier application Q point is selected into center of load line justify & explain the statement.
- Explain the details effect of coupling capacitor on frequency response of CE amplifier.
- Derive the relation between  $\alpha$  &  $\beta$ , derive equation for  $\alpha$  &  $\beta$
- Explain neat diagram of DC load line of BJT? Write significance of load line.
- Define the terms related to small signal parameter of JFET-
  - DC drain to source resistance
  - Amplification factor
  - AC drain resistance
  - Transconductance

**Q.3 Answer the Following. (Any Two) 12**

- Draw & Explain V-I characteristics of JFET, also draw & explain V-I characteristics for different value of  $V_{GS}$ .
- Design a single stage CE amplifier which has  $V_{CEQ} = 5V$ ,  $I_{CEQ} = 5\text{ mA}$ ,  $V_{CC} = 12V$ ,  $A_V = 100$ ,  $A_i = 150$ ,  $V_{BE} = 0.6V$ ,  $h_{ie} = 2.5\text{ k}\Omega$ ,  $s = 3$ ,  $R_L = 1\text{ k}\Omega$ .
- Determine the voltage gain, current gain, input resistance using hybrid model of BJT in a CE Amplifier?

**Section – II**

**Q.4 Answer the Following. (Any Four) 16**

- Draw the Circuit diagram of Full wave center tap rectifier with  $\pi$  filter. Explain.
- Explain crossover distortion in power amplifier with suitable diagram.
- Compare small signal and large signal amplifier.
- Explain what is feedback circuit? Explain how it provides feedback in amplifiers.
- Differentiate between negative and positive feedback amplifiers.

**Q.5 Answer the Following. (Any Two) 12**

- Design an unregulated power supply using capacitor filter, supply to give DC output voltage of 50V at 1K $\Omega$  load with ripple factor not exceeding 3%. Use two diode rectifiers.
- Explain the concept of critical inductance in LC filter with their derivation.
- Explain types of negative feedback with block diagram.

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**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**

**ELECTRICAL ENGINEERING**

**Electronic Devices and Circuits (BTN07305)**

Day & Date: Thursday, 16-05-2024

Max. Marks: 70

Time: 03:00 PM To 06:00 PM

**Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no. 03 (Starting page of the Answer Book). Each question carries one mark.

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.

3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

**14**

- 1) Thermal run away occurs when \_\_\_\_\_.
  - a) Collector is reverse biased
  - b) Transistor is not biased
  - c) Emitter is forward biased
  - d) Junction capacitance is high
- 2) The disadvantage of voltage divider bias that it has \_\_\_\_\_.
  - a) High stability factor
  - b) Low base current
  - c) Many resistor
  - d) None of the above
- 3) Zener diode can be used as \_\_\_\_\_.
  - a) voltage regulator only
  - b) voltage regulator only
  - c) both dc and ac voltage regulator
  - d) none of the above
- 4) The dc current gain in common collector configuration is given by \_\_\_\_\_.
  - a)  $\alpha$
  - b)  $\beta$
  - c)  $\beta + 1$
  - d)  $\alpha + 1$
- 5) In which mode of BJT operation are both junctions reverse biased \_\_\_\_\_.
  - a) active
  - b) saturation
  - c) cut off
  - d) reverse active
- 6) For an NPN transistor in normal bias \_\_\_\_\_.
  - a) Only holes cross the collector junction
  - b) Only majority carriers cross the collector junction
  - c) The emitter junction has high resistance
  - d) Emitter junction is forward biased and collector junction is reverse biased
- 7) The ideal value for stability factor for biasing circuit is \_\_\_\_\_.
  - a) 1
  - b) 5
  - c) 0
  - d) 100

- 8) In BJT base region is made very thin so that \_\_\_\_\_.  
a) recombination in base region is minimum  
b) electric field gradient in base is high  
c) base can be easily fabricated  
d) base can be easily biased
- 9) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region?  
a) About  $0^\circ$   
b)  $45^\circ$   
c) About  $90^\circ$   
d) None of the above
- 10) If temperature changes,  $h$  parameters of a transistor \_\_\_\_\_.  
a) May or may not change  
b) Do not change  
c) Also change  
d) None of the above
- 11) In an unregulated power supply, if load current increases, the output voltage \_\_\_\_\_.  
a) Remains the same  
b) Decreases  
c) Increases  
d) None of the above
- 12) The gain of an amplifier without feedback is 100 dB. If negative feedback of 3 dB is applied, the gain of the amplifier will become \_\_\_\_\_.  
a) 5 dB  
b) 300 dB  
c) 103 dB  
d) 97 dB
- 13) An emitter-follower is also known as a \_\_\_\_\_.  
a) common-emitter amplifier  
b) common-base amplifier  
c) common-collector amplifier  
d) Darlington pair
- 14) A transistor behaves as a linear device for \_\_\_\_\_.  
a) Small signals only  
b) Large signals only  
c) Both small and large signals  
d) None of the above

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Set **R**

**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRICAL ENGINEERING**  
**Electronic Devices and Circuits (BTN07305)**

Day & Date: Thursday, 16-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Answer the Following. (Any Four)** **16**

- For amplifier application Q point is selected into center of load line justify & explain the statement.
- Explain the details effect of coupling capacitor on frequency response of CE amplifier.
- Derive the relation between  $\alpha$  &  $\beta$ , derive equation for  $\alpha$  &  $\beta$
- Explain neat diagram of DC load line of BJT? Write significance of load line.
- Define the terms related to small signal parameter of JFET-
  - DC drain to source resistance
  - Amplification factor
  - AC drain resistance
  - Transconductance

**Q.3 Answer the Following. (Any Two)** **12**

- Draw & Explain V-I characteristics of JFET, also draw & explain V-I characteristics for different value of  $V_{GS}$ .
- Design a single stage CE amplifier which has  $V_{CEQ} = 5V$ ,  $I_{CEQ} = 5\text{ mA}$ ,  $V_{CC} = 12V$ ,  $A_V = 100$ ,  $A_i = 150$ ,  $V_{BE} = 0.6V$ ,  $h_{ie} = 2.5\text{ k}\Omega$ ,  $s = 3$ ,  $R_L = 1\text{ k}\Omega$ .
- Determine the voltage gain, current gain, input resistance using hybrid model of BJT in a CE Amplifier?

**Section – II**

**Q.4 Answer the Following. (Any Four)** **16**

- Draw the Circuit diagram of Full wave center tap rectifier with  $\pi$  filter. Explain.
- Explain crossover distortion in power amplifier with suitable diagram.
- Compare small signal and large signal amplifier.
- Explain what is feedback circuit? Explain how it provides feedback in amplifiers.
- Differentiate between negative and positive feedback amplifiers.

**Q.5 Answer the Following. (Any Two)** **12**

- Design an unregulated power supply using capacitor filter, supply to give DC output voltage of 50V at 1K $\Omega$  load with ripple factor not exceeding 3%. Use two diode rectifiers.
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**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April - 2024**  
**ELECTRICAL ENGINEERING**  
**Electronic Devices and Circuits (BTN07305)**

Day & Date: Thursday, 16-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no. 03 (Starting page of the Answer Book). Each question carries one mark.  
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 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options. 14**

- 1) If temperature changes,  $h$  parameters of a transistor \_\_\_\_\_.  
 a) May or may not change                      b) Do not change  
 c) Also change                                      d) None of the above
- 2) In an unregulated power supply, if load current increases, the output voltage \_\_\_\_\_.  
 a) Remains the same                              b) Decreases  
 c) Increases                                          d) None of the above
- 3) The gain of an amplifier without feedback is 100 dB. If negative feedback of 3 db is applied, the gain of the amplifier will become \_\_\_\_\_.  
 a) 5 dB                                                  b) 300 dB  
 c) 103 dB                                              d) 97 dB
- 4) An emitter-follower is also known as a \_\_\_\_\_.  
 a) common-emitter amplifier                      b) common-base amplifier  
 c) common-collector amplifier                      d) Darlington pair
- 5) A transistor behaves as a linear device for \_\_\_\_\_.  
 a) Small signals only                                  b) Large signals only  
 c) Both small and large signals                      d) None of the above
- 6) Thermal run away occurs when \_\_\_\_\_.  
 a) Collector is reverse biased                      b) Transistor is not biased  
 c) Emitter is forward biased                          d) Junction capacitance is high
- 7) The disadvantage of voltage divider bias that it has \_\_\_\_\_.  
 a) High stability factor                                  b) Low base current  
 c) Many resistor                                      d) None of the above
- 8) Zener diode can be used as \_\_\_\_\_.  
 a) voltage regulator only  
 b) voltage regulator only  
 c) both dc and ac voltage regulator  
 d) none of the above

- 9) The dc current gain in common collector configuration is given by \_\_\_\_\_.
  - a)  $\alpha$
  - b)  $\beta$
  - c)  $\beta + 1$
  - d)  $\alpha + 1$
- 10) In which mode of BJT operation are both junctions reverse biased \_\_\_\_\_.
  - a) active
  - b) saturation
  - c) cut off
  - d) reverse active
- 11) For an NPN transistor in normal bias \_\_\_\_\_.
  - a) Only holes cross the collector junction
  - b) Only majority carriers cross the collector junction
  - c) The emitter junction has high resistance
  - d) Emitter junction is forward biased and collector junction is reverse biased
- 12) The ideal value for stability factor for biasing circuit is \_\_\_\_\_.
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  - b) 5
  - c) 0
  - d) 100
- 13) In BJT base region is made very thin so that \_\_\_\_\_.
  - a) recombination in base region is minimum
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  - c) base can be easily fabricated
  - d) base can be easily biased
- 14) In the input RC circuit of a single stage BJT, by how much does the base voltage lead the input voltage for frequencies much larger than the cutoff frequency in the low frequency region?
  - a) About  $0^\circ$
  - b)  $45^\circ$
  - c) About  $90^\circ$
  - d) None of the above

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Set **S**

**S. Y. (B Tech) (Sem - I) (New) (CBCS) Examination: March/April – 2024**  
**ELECTRICAL ENGINEERING**  
**Electronic Devices and Circuits (BTN07305)**

Day & Date: Thursday, 16-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Answer the Following. (Any Four)** **16**

- For amplifier application Q point is selected into center of load line justify & explain the statement.
- Explain the details effect of coupling capacitor on frequency response of CE amplifier.
- Derive the relation between  $\alpha$  &  $\beta$ , derive equation for  $\alpha$  &  $\beta$
- Explain neat diagram of DC load line of BJT? Write significance of load line.
- Define the terms related to small signal parameter of JFET-
  - DC drain to source resistance
  - Amplification factor
  - AC drain resistance
  - Transconductance

**Q.3 Answer the Following. (Any Two)** **12**

- Draw & Explain V-I characteristics of JFET, also draw & explain V-I characteristics for different value of  $V_{GS}$ .
- Design a single stage CE amplifier which has  $V_{CEQ} = 5V$ ,  $I_{CEQ} = 5\text{ mA}$ ,  $V_{CC} = 12V$ ,  $A_V = 100$ ,  $A_i = 150$ ,  $V_{BE} = 0.6V$ ,  $h_{ie} = 2.5\text{ k}\Omega$ ,  $s = 3$ ,  $R_L = 1\text{ k}\Omega$ .
- Determine the voltage gain, current gain, input resistance using hybrid model of BJT in a CE Amplifier?

**Section – II**

**Q.4 Answer the Following. (Any Four)** **16**

- Draw the Circuit diagram of Full wave center tap rectifier with  $\pi$  filter. Explain.
- Explain crossover distortion in power amplifier with suitable diagram.
- Compare small signal and large signal amplifier.
- Explain what is feedback circuit? Explain how it provides feedback in amplifiers.
- Differentiate between negative and positive feedback amplifiers.

**Q.5 Answer the Following. (Any Two)** **12**

- Design an unregulated power supply using capacitor filter, supply to give DC output voltage of 50V at 1K $\Omega$  load with ripple factor not exceeding 3%. Use two diode rectifiers.
- Explain the concept of critical inductance in LC filter with their derivation.
- Explain types of negative feedback with block diagram.

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**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Measurement and Instrumentation (BTN07303)**

Day & Date: Friday, 17-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no. 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options. 14**

- 1) An instrument transformer is used to extend the range of \_\_\_\_\_.  
 a) induction instrument                      b) electrostatic instrument  
 c) moving coil instrument                      d) any of the above
- 2) For measurement of mutual inductance, we can use \_\_\_\_\_.  
 a) Anderson bridge                      b) Maxwell's bridge  
 c) Heaviside bridge                      d) Any of the above
- 3) In a Weston frequency meter, the magnetic axes of the two fixed coils are \_\_\_\_\_.  
 a) parallel                      b) perpendicular  
 c) inclined at 60°                      d) inclined at 120°
- 4) To measure radio frequency, the suitable frequency meter is \_\_\_\_\_.  
 a) Weston frequency meter  
 b) reed vibrator frequency meter  
 c) heterodoxy frequency meter  
 d) electrical resonance frequency meter
- 5) A CRO can display \_\_\_\_\_.  
 a) AC signals                      b) DC signals  
 c) Both AC and DC signals                      d) Time invariant signals
- 6) The internal resistance of an ammeter should be \_\_\_\_\_.  
 a) Very small                      b) Medium  
 c) High                      d) Infinity
- 7) In a moving coil instrument, the deflecting torque is proportional to \_\_\_\_\_.  
 a) Current                      b) Square of the current  
 c) Square root of the current                      d) sine of the measurand
- 8) \_\_\_\_\_ instruments are those which measure the total quantity of electricity delivered in a particular time.  
 a) Absolute                      b) Indicating  
 c) Recording                      d) Integrating

- 9) For handling greater currents induction wattmeters are used in conjunction with \_\_\_\_\_.  
a) potential transformers                      b) current transformers  
c) power transformer                          d) either of the above
- 10) Induction type single phase energy meters measure electric energy in \_\_\_\_\_.  
a) kW                                              Wh  
c) kWh                                              VAR
- 11) In majority of instruments damping is provided by \_\_\_\_\_.  
a) fluid friction                                  b) spring  
c) eddy currents                                  d) all of the above
- 12) Basically, a potentiometer is a device for \_\_\_\_\_.  
a) comparing two voltages                      b) measuring a current  
c) comparing two currents                      d) measuring a voltage
- 13) In order to achieve high accuracy, the slide wire of a potentiometer should be \_\_\_\_\_.  
a) as long as possible                          b) as short as possible  
c) neither too small not too large              d) very thick
- 14) Instrument transformers are \_\_\_\_\_.  
a) potential transformers                      b) current transformers  
c) both (a) and (b)                              d) power transformers

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**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Measurement and Instrumentation (BTN07303)**

Day & Date: Friday, 17-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any FOUR.** **16**

- Explain PMMC type instrument with neat sketch.
- Write classification of measuring instruments.
- Define standard & explain types of standard.
- With neat diagram explain the working of megger.
- Explain Maxwell's capacitance bridge with phasor diagram.

**Q.3 Attempt any TWO.** **12**

- Explain 1- $\Phi$  electro-dynamometer power factor meter with construction & operation.
- Derive the expression for unknown capacitance with phasor diagram by using Schering Bridge.
- A bridge consists of the following:  
 Arm ab : - A choke coil having resistance  $R_1$  & inductance  $L_1$   
 Arm bc : - A non-inductive resistance  $R_3$   
 Arm cd : - A mica condenser  $C_4$  in series with non-inductive resistance  $R_4$   
 Arm da : - A non-inductive resistance  $R_2$   
 When this bridge fed from a source of 500 Hz, balance is obtained under following conditions  
 $R_2 = 2410 \Omega$ ,  $R_3 = 750 \Omega$ ,  $C_4 = 0.35 \mu F$ ,  $R_4 = 64.5 \Omega$   
 The series resistance of capacitor is  $0.4 \Omega$ . Calculate resistance and Inductance of choke coil. The supply is connected between a & c and detector is between b & d.

**Section – II**

**Q.4 Attempt any FOUR.** **16**

- Write difference between Current Transformer and Potential Transformer.
- Explain digital measurement of time period.
- With neat diagram explain Q-meter.
- Write note on digital storage oscilloscope.
- Explain with neat diagram electronic counter.

**Q.5 Attempt any TWO.** **12**

- Explain Electronic energy meter with construction and working principle.
- Explain with neat diagram, working of ramp type digital voltmeter.
- Draw typical phasor diagram of potential transformer. Derive an expression for actual transformation ratio.

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Set **Q**

**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Measurement and Instrumentation (BTN07303)**

Day & Date: Friday, 17-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book page no. 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

**14**

- 1) \_\_\_\_\_ instruments are those which measure the total quantity of electricity delivered in a particular time.
  - a) Absolute
  - b) Indicating
  - c) Recording
  - d) Integrating
- 2) For handling greater currents induction wattmeters are used in conjunction with \_\_\_\_\_.
  - a) potential transformers
  - b) current transformers
  - c) power transformer
  - d) either of the above
- 3) Induction type single phase energy meters measure electric energy in \_\_\_\_\_.
  - a) kW
  - b) Wh
  - c) kWh
  - d) VAR
- 4) In majority of instruments damping is provided by \_\_\_\_\_.
  - a) fluid friction
  - b) spring
  - c) eddy currents
  - d) all of the above
- 5) Basically, a potentiometer is a device for \_\_\_\_\_.
  - a) comparing two voltages
  - b) measuring a current
  - c) comparing two currents
  - d) measuring a voltage
- 6) In order to achieve high accuracy, the slide wire of a potentiometer should be \_\_\_\_\_.
  - a) as long as possible
  - b) as short as possible
  - c) neither too small not too large
  - d) very thick
- 7) Instrument transformers are \_\_\_\_\_.
  - a) potential transformers
  - b) current transformers
  - c) both (a) and (b)
  - d) power transformers
- 8) An instrument transformer is used to extend the range of \_\_\_\_\_.
  - a) induction instrument
  - b) electrostatic instrument
  - c) moving coil instrument
  - d) any of the above
- 9) For measurement of mutual inductance, we can use \_\_\_\_\_.
  - a) Anderson bridge
  - b) Maxwell's bridge
  - c) Heaviside bridge
  - d) Any of the above

- 10)** In a Weston frequency meter, the magnetic axes of the two fixed coils are \_\_\_\_.
- a) parallel
  - b) perpendicular
  - c) inclined at  $60^\circ$
  - d) inclined at  $120^\circ$
- 11)** To measure radio frequency, the suitable frequency meter is \_\_\_\_.
- a) Weston frequency meter
  - b) reed vibrator frequency meter
  - c) heterodoxy frequency meter
  - d) electrical resonance frequency meter
- 12)** A CRO can display \_\_\_\_.
- a) AC signals
  - b) DC signals
  - c) Both AC and DC signals
  - d) Time invariant signals
- 13)** The internal resistance of an ammeter should be \_\_\_\_.
- a) Very small
  - b) Medium
  - c) High
  - d) Infinity
- 14)** In a moving coil instrument, the deflecting torque is proportional to \_\_\_\_.
- a) Current
  - b) Square of the current
  - c) Square root of the current
  - d) sine of the measurand



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Set **Q**

**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Measurement and Instrumentation (BTN07303)**

Day & Date: Friday, 17-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I****Q.2 Attempt any FOUR. 16**

- Explain PMMC type instrument with neat sketch.
- Write classification of measuring instruments.
- Define standard & explain types of standard.
- With neat diagram explain the working of megger.
- Explain Maxwell's capacitance bridge with phasor diagram.

**Q.3 Attempt any TWO. 12**

- Explain 1- $\Phi$  electro-dynamometer power factor meter with construction & operation.
- Derive the expression for unknown capacitance with phasor diagram by using Schering Bridge.
- A bridge consists of the following:  
 Arm ab : - A choke coil having resistance  $R_1$  & inductance  $L_1$   
 Arm bc : - A non-inductive resistance  $R_3$   
 Arm cd : - A mica condenser  $C_4$  in series with non-inductive resistance  $R_4$   
 Arm da : - A non-inductive resistance  $R_2$   
 When this bridge fed from a source of 500 Hz, balance is obtained under following conditions  
 $R_2 = 2410 \Omega$ ,  $R_3 = 750 \Omega$ ,  $C_4 = 0.35 \mu F$ ,  $R_4 = 64.5 \Omega$   
 The series resistance of capacitor is  $0.4 \Omega$ . Calculate resistance and Inductance of choke coil. The supply is connected between a & c and detector is between b & d.

**Section – II****Q.4 Attempt any FOUR. 16**

- Write difference between Current Transformer and Potential Transformer.
- Explain digital measurement of time period.
- With neat diagram explain Q-meter.
- Write note on digital storage oscilloscope.
- Explain with neat diagram electronic counter.

**Q.5 Attempt any TWO. 12**

- Explain Electronic energy meter with construction and working principle.
- Explain with neat diagram, working of ramp type digital voltmeter.
- Draw typical phasor diagram of potential transformer. Derive an expression for actual transformation ratio.



- 10) The internal resistance of an ammeter should be \_\_\_\_\_.  
a) Very small                      b) Medium  
c) High                                d) Infinity
- 11) In a moving coil instrument, the deflecting torque is proportional to \_\_\_\_\_.  
a) Current                          b) Square of the current  
c) Square root of the current     d) sine of the measurand
- 12) \_\_\_\_\_ instruments are those which measure the total quantity of electricity delivered in a particular time.  
a) Absolute                          b) Indicating  
c) Recording                         d) Integrating
- 13) For handling greater currents induction wattmeters are used in conjunction with \_\_\_\_\_.  
a) potential transformers            b) current transformers  
c) power transformer                d) either of the above
- 14) Induction type single phase energy meters measure electric energy in \_\_\_\_\_.  
a) kW                                  Wh  
c) kWh                                VAR

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**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Measurement and Instrumentation (BTN07303)**

Day & Date: Friday, 17-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any FOUR.** **16**

- Explain PMMC type instrument with neat sketch.
- Write classification of measuring instruments.
- Define standard & explain types of standard.
- With neat diagram explain the working of megger.
- Explain Maxwell's capacitance bridge with phasor diagram.

**Q.3 Attempt any TWO.** **12**

- Explain 1- $\Phi$  electro-dynamometer power factor meter with construction & operation.
- Derive the expression for unknown capacitance with phasor diagram by using Schering Bridge.
- A bridge consists of the following:  
 Arm ab : - A choke coil having resistance  $R_1$  & inductance  $L_1$   
 Arm bc : - A non-inductive resistance  $R_3$   
 Arm cd : - A mica condenser  $C_4$  in series with non-inductive resistance  $R_4$   
 Arm da : - A non-inductive resistance  $R_2$   
 When this bridge fed from a source of 500 Hz, balance is obtained under following conditions  
 $R_2 = 2410 \Omega$ ,  $R_3 = 750 \Omega$ ,  $C_4 = 0.35 \mu F$ ,  $R_4 = 64.5 \Omega$   
 The series resistance of capacitor is  $0.4 \Omega$ . Calculate resistance and Inductance of choke coil. The supply is connected between a & c and detector is between b & d.

**Section – II**

**Q.4 Attempt any FOUR.** **16**

- Write difference between Current Transformer and Potential Transformer.
- Explain digital measurement of time period.
- With neat diagram explain Q-meter.
- Write note on digital storage oscilloscope.
- Explain with neat diagram electronic counter.

**Q.5 Attempt any TWO.** **12**

- Explain Electronic energy meter with construction and working principle.
- Explain with neat diagram, working of ramp type digital voltmeter.
- Draw typical phasor diagram of potential transformer. Derive an expression for actual transformation ratio.

**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Measurement and Instrumentation (BTN07303)**

Max. Marks: 70

### MCQ/Objective Type Questions

Marks:14

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- Page 10 of 12

- 10)** An instrument transformer is used to extend the range of \_\_\_\_\_.  
a) induction instrument                      b) electrostatic instrument  
c) moving coil instrument                      d) any of the above
- 11)** For measurement of mutual inductance, we can use \_\_\_\_\_.  
a) Anderson bridge                      b) Maxwell's bridge  
c) Heaviside bridge                      d) Any of the above
- 12)** In a Weston frequency meter, the magnetic axes of the two fixed coils are \_\_\_\_\_.  
a) parallel                      b) perpendicular  
c) inclined at  $60^\circ$                       d) inclined at  $120^\circ$
- 13)** To measure radio frequency, the suitable frequency meter is \_\_\_\_\_.  
a) Weston frequency meter  
b) reed vibrator frequency meter  
c) heterodoxy frequency meter  
d) electrical resonance frequency meter
- 14)** A CRO can display \_\_\_\_\_.  
a) AC signals                      b) DC signals  
c) Both AC and DC signals                      d) Time invariant signals

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**S. Y. (B.Tech.) (Sem - I) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Measurement and Instrumentation (BTN07303)**

Day & Date: Friday, 17-05-2024  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any FOUR. 16**

- Explain PMMC type instrument with neat sketch.
- Write classification of measuring instruments.
- Define standard & explain types of standard.
- With neat diagram explain the working of megger.
- Explain Maxwell's capacitance bridge with phasor diagram.

**Q.3 Attempt any TWO. 12**

- Explain 1- $\Phi$  electro-dynamometer power factor meter with construction & operation.
- Derive the expression for unknown capacitance with phasor diagram by using Schering Bridge.
- A bridge consists of the following:  
 Arm ab : - A choke coil having resistance  $R_1$  & inductance  $L_1$   
 Arm bc : - A non-inductive resistance  $R_3$   
 Arm cd : - A mica condenser  $C_4$  in series with non-inductive resistance  $R_4$   
 Arm da : - A non-inductive resistance  $R_2$   
 When this bridge fed from a source of 500 Hz, balance is obtained under following conditions  
 $R_2 = 2410 \Omega$ ,  $R_3 = 750 \Omega$ ,  $C_4 = 0.35 \mu F$ ,  $R_4 = 64.5 \Omega$   
 The series resistance of capacitor is  $0.4 \Omega$ . Calculate resistance and Inductance of choke coil. The supply is connected between a & c and detector is between b & d.

**Section – II**

**Q.4 Attempt any FOUR. 16**

- Write difference between Current Transformer and Potential Transformer.
- Explain digital measurement of time period.
- With neat diagram explain Q-meter.
- Write note on digital storage oscilloscope.
- Explain with neat diagram electronic counter.

**Q.5 Attempt any TWO. 12**

- Explain Electronic energy meter with construction and working principle.
- Explain with neat diagram, working of ramp type digital voltmeter.
- Draw typical phasor diagram of potential transformer. Derive an expression for actual transformation ratio.

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Max. Marks: 70

Marks:14

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**Set P**

**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines – II (BTN07402)**

Day & Date: Wednesday, 22-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data if necessary.  
 4) Draw neat diagrams whenever necessary.

**Section – I****Q.2 Attempt any four of the following.****16**

- Explain how rotating magnetic field is created when 3 Ph supply voltage is given to the 3 Ph stator winding.
- Compare squirrel cage and slip ring Induction Motor with respect to construction, performance parameters and cost.
- With a neat sketch explain the DOL starter.
- A 400 V, 50 Hz 30 hp, three-phase induction motor is drawing 50 A current at 0.8 power factor lagging. The stator and rotor copper losses are 1.5 kW and 900 W respectively. The friction and windage losses are 1050 W and the core losses are 1200 W. Calculate the air-gap power of the motor?
- A three-phase cage induction motor is started by direct-on-line (DOL) switching at the rated voltage. If the starting current drawn is 6 times the full load current, and the full load slip is 4%, then calculate the ratio of the starting developed torque to the full load torque?
- Explain induction motor as an induction generator and its limitations.

**Q.3 Attempt any two of the following.****12**

- Explain speed control of IM by pole changing & emf injection method.
- A 746 KW, 3 Ph, 50 Hz, 16 pole Induction Motor has a rotor impedance of  $(0.02 + j0.15)\Omega$  at standstill. Full load torque is obtained at 360 rpm. Calculate:
  - The ratio of the Max to Full load torque
  - The speed of Max torque and
  - The rotor resistance to be added to get Max starting torque
- Draw the circle diagram of a 7.46 KW, 200 V, 50 Hz, 3 Ph slip ring with a star connected stator and rotor, a winding ratio of unity, a stator resistance of 0.38 ohm/phase and a rotor resistance of 0.24 ohm/phase. The following are the test readings.  
 No-load: 220 V, 7.7 A, P.F. = 0.195  
 Short-Circuit: 100 V, 47.6 A, P.F. = 0.454 Find,
  - Starting torque
  - Max torque, both in synchronous watts
  - the maximum power factor
  - slip for maximum torque
  - the maximum output

**Section – II**

**Q.4 Attempt any four of the following. 16**

- a) Explain why single phase induction motor is not self-started.
- b) Explain with diagram operation of shaded pole induction motor.
- c) Explain the constructional feature of synchronous motor.
- d) Derive EMF equation of alternator with short pitched coils and distributed windings.
- e) Explain working principle of synchronous motor.
- f) State and explain different losses in synchronous motor.

**Q.5 Attempt any two of the following. 12**

- a) Define and derive expression for pitch factor and distribution factor in case of alternator.
- b) Explain MMF method of calculating voltage regulation of an alternator when power factor is lagging.
- c) Why synchronous motor is not self-started? Explain different methods of starting of synchronous motor.

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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

**ELECTRICAL ENGINEERING****Electrical Machines – II (BTN07402)**

Day &amp; Date: Wednesday, 22-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Assume data wherever necessary

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose correct answer.****14**

- 1) What type of operations are used in the starting (auxiliary) switches in a single-phase induction motor?
  - a) mechanical operation
  - b) electrical operation
  - c) centrifugal operation and mechanical operation
  - d) centrifugal operation
- 2) In a shaded pole single-phase motor, the revolving field is produced by the use of \_\_\_\_\_.
  - a) Inductor
  - b) Capacitor
  - c) Resistor
  - d) Shading coils
- 3) What is the coil span for a 2 pole 18 slot machine?
  - a) 9
  - b) 4.5
  - c) 18
  - d) 6
- 4) Armature reaction in an alternator primarily affects \_\_\_\_\_.
  - a) rotor speed
  - b) terminal voltage per phase
  - c) frequency of armature current
  - d) generated voltage per phase
- 5) In a 3-phase, 4-pole, 50 Hz synchronous motor, the frequency, pole number and load torque all are halved. The motor speed will be \_\_\_\_\_.
  - a) 3000 r.p.m.
  - b) 750 r.p.m.
  - c) 1500 r.p.m.
  - d) None of the above
- 6) Torque angle  $\lambda$  is the angle between \_\_\_\_\_.
  - a) stator MMF  $F_s$  and resultant MMF  $F_R$
  - b) stator MMF  $F_s$  and rotor MMF  $F_r$
  - c) rotor MMF  $F_r$  and resultant MMF  $F_R$
  - d) any of the mentioned

- 7) When the excitation of an unloaded salient pole synchronous motor suddenly gets disconnected \_\_\_\_\_.  
 a) the motor stops  
 b) it runs as a reluctance motor at the same speed  
 c) it runs as a reluctance motor at a lower speed  
 d) None of the above
- 8) The speed at which rotating magnetic field revolves is called \_\_\_\_\_.  
 a) Induction speed  
 b) Synchronous speed  
 c) Relative speed  
 d) Rotating speed
- 9) In a 3-phase induction generator which is self-excited, load has been increased. To keep the frequency of the generated voltage constant, speed of the induction machine should be \_\_\_\_\_.  
 a) increased  
 b) maintained less than rated synchronous speed  
 c) decreased  
 d) maintained more than rated synchronous speed
- 10) Blocked rotor test is conducted to find the \_\_\_\_\_.  
 a) leakage impedance  
 b) leakage reactance  
 c) stator impedance  
 d) rotor impedance
- 11) In India, direct - on - line starter can be used for 3 - phase squirrel cage induction motor up to the rating of \_\_\_\_\_.  
 a) 5 HP  
 b) 10 HP  
 c) 15 HP  
 d) 25 HP
- 12) The relation between maximum torque and full load torque ( $T_{max}$ ,  $T_f$  respectively) when referred to induction motor is given by \_\_\_\_\_.  
 a)  $T_f/T_{max} = 2a/(a^2 + s^2)$   
 b)  $T_f/T_{max} = 2/(a^2 + s^2)$   
 c)  $T_f/T_{max} = 2as/(a^2 + s^2)$   
 d)  $T_f/T_{max} = a/(a^2 + s^2)$
- 13) In squirrel cage I.M. torque with autotransformer starter is \_\_\_\_\_ times the torque with direct switching.  
 a)  $K^2$   
 b)  $1/K$   
 c)  $K$   
 d) None of the above
- 14) Regarding skewing of motor bars in a squirrel cage induction motor, which statement is false?  
 a) It prevents cogging  
 b) It increases starting torque  
 c) It produces more uniform torque  
 d) It reduces motor 'hum' during its operation

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**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines – II (BTN07402)**

Day & Date: Wednesday, 22-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data if necessary.  
 4) Draw neat diagrams whenever necessary.

**Section – I**

**Q.2 Attempt any four of the following. 16**

- Explain how rotating magnetic field is created when 3 Ph supply voltage is given to the 3 Ph stator winding.
- Compare squirrel cage and slip ring Induction Motor with respect to construction, performance parameters and cost.
- With a neat sketch explain the DOL starter.
- A 400 V, 50 Hz 30 hp, three-phase induction motor is drawing 50 A current at 0.8 power factor lagging. The stator and rotor copper losses are 1.5 kW and 900 W respectively. The friction and windage losses are 1050 W and the core losses are 1200 W. Calculate the air-gap power of the motor?
- A three-phase cage induction motor is started by direct-on-line (DOL) switching at the rated voltage. If the starting current drawn is 6 times the full load current, and the full load slip is 4%, then calculate the ratio of the starting developed torque to the full load torque?
- Explain induction motor as an induction generator and its limitations.

**Q.3 Attempt any two of the following. 12**

- Explain speed control of IM by pole changing & emf injection method.
- A 746 KW, 3 Ph, 50 Hz, 16 pole Induction Motor has a rotor impedance of  $(0.02 + j0.15)\Omega$  at standstill. Full load torque is obtained at 360 rpm. Calculate:
  - The ratio of the Max to Full load torque
  - The speed of Max torque and
  - The rotor resistance to be added to get Max starting torque
- Draw the circle diagram of a 7.46 KW, 200 V, 50 Hz, 3 Ph slip ring with a star connected stator and rotor, a winding ratio of unity, a stator resistance of 0.38 ohm/phase and a rotor resistance of 0.24 ohm/phase. The following are the test readings.  
 No-load: 220 V, 7.7 A, P.F. = 0.195  
 Short-Circuit: 100 V, 47.6 A, P.F. = 0.454 Find,
  - Starting torque
  - Max torque, both in synchronous watts
  - the maximum power factor
  - slip for maximum torque
  - the maximum output

**Section – II**

**Q.4 Attempt any four of the following. 16**

- a) Explain why single phase induction motor is not self-started.
- b) Explain with diagram operation of shaded pole induction motor.
- c) Explain the constructional feature of synchronous motor.
- d) Derive EMF equation of alternator with short pitched coils and distributed windings.
- e) Explain working principle of synchronous motor.
- f) State and explain different losses in synchronous motor.

**Q.5 Attempt any two of the following. 12**

- a) Define and derive expression for pitch factor and distribution factor in case of alternator.
- b) Explain MMF method of calculating voltage regulation of an alternator when power factor is lagging.
- c) Why synchronous motor is not self-started? Explain different methods of starting of synchronous motor.

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S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

**ELECTRICAL ENGINEERING****Electrical Machines – II (BTN07402)**

Day &amp; Date: Wednesday, 22-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:**
- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
  - 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
  - 3) Figures to the right indicates full marks.
  - 4) Assume data wherever necessary

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose correct answer.****14**

- 1) Armature reaction in an alternator primarily affects \_\_\_\_\_.
  - a) rotor speed
  - b) terminal voltage per phase
  - c) frequency of armature current
  - d) generated voltage per phase
- 2) In a 3-phase, 4-pole, 50 Hz synchronous motor, the frequency, pole number and load torque all are halved. The motor speed will be \_\_\_\_\_.
  - a) 3000 r.p.m.
  - b) 750 r.p.m.
  - c) 1500 r.p.m.
  - d) None of the above
- 3) Torque angle  $\lambda$  is the angle between \_\_\_\_\_.
  - a) stator MMF  $F_s$  and resultant MMF  $F_R$
  - b) stator MMF  $F_s$  and rotor MMF  $F_r$
  - c) rotor MMF  $F_r$  and resultant MMF  $F_R$
  - d) any of the mentioned
- 4) When the excitation of an unloaded salient pole synchronous motor suddenly gets disconnected \_\_\_\_\_.
  - a) the motor stops
  - b) it runs as a reluctance motor at the same speed
  - c) it runs as a reluctance motor at a lower speed
  - d) None of the above
- 5) The speed at which rotating magnetic field revolves is called \_\_\_\_\_.
  - a) Induction speed
  - b) Synchronous speed
  - c) Relative speed
  - d) Rotating speed
- 6) In a 3-phase induction generator which is self-excited, load has been increased. To keep the frequency of the generated voltage constant, speed of the induction machine should be \_\_\_\_\_.
  - a) increased
  - b) maintained less than rated synchronous speed
  - c) decreased
  - d) maintained more than rated synchronous speed



- 7) Blocked rotor test is conducted to find the \_\_\_\_\_.  
a) leakage impedance                      b) leakage reactance  
c) stator impedance                      d) rotor impedance
- 8) In India, direct - on - line starter can be used for 3 - phase squirrel cage induction motor up to the rating of \_\_\_\_\_.  
a) 5 HP                                      b) 10 HP  
c) 15 HP                                      d) 25 HP
- 9) The relation between maximum torque and full load torque ( $T_{max}$ ,  $T_f$  respectively) when referred to induction motor is given by \_\_\_\_\_.  
a)  $T_f/T_{max} = 2a/(a^2 + s^2)$                       b)  $T_f/T_{max} = 2/(a^2 + s^2)$   
c)  $T_f/T_{max} = 2as/(a^2 + s^2)$                       d)  $T_f/T_{max} = a/(a^2 + s^2)$
- 10) In squirrel cage I.M. torque with autotransformer starter is \_\_\_\_\_ times the torque with direct switching.  
a)  $K^2$                                       b)  $1/K$   
c)  $K$                                       d) None of the above
- 11) Regarding skewing of motor bars in a squirrel cage induction motor, which statement is false?  
a) It prevents cogging  
b) It increases starting torque  
c) It produces more uniform torque  
d) It reduces motor 'hum' during its operation
- 12) What type of operations are used in the starting (auxiliary) switches in a single-phase induction motor?  
a) mechanical operation  
b) electrical operation  
c) centrifugal operation and mechanical operation  
d) centrifugal operation
- 13) In a shaded pole single-phase motor, the revolving field is produced by the use of \_\_\_\_\_.  
a) Inductor                                      b) Capacitor  
c) Resistor                                      d) Shading coils
- 14) What is the coil span for a 2 pole 18 slot machine?  
a) 9                                      b) 4.5  
c) 18                                      d) 6

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**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines – II (BTN07402)**

Day & Date: Wednesday, 22-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data if necessary.  
 4) Draw neat diagrams whenever necessary.

**Section – I**

**Q.2 Attempt any four of the following. 16**

- a) Explain how rotating magnetic field is created when 3 Ph supply voltage is given to the 3 Ph stator winding.
- b) Compare squirrel cage and slip ring Induction Motor with respect to construction, performance parameters and cost.
- c) With a neat sketch explain the DOL starter.
- d) A 400 V, 50 Hz 30 hp, three-phase induction motor is drawing 50 A current at 0.8 power factor lagging. The stator and rotor copper losses are 1.5 kW and 900 W respectively. The friction and windage losses are 1050 W and the core losses are 1200 W. Calculate the air-gap power of the motor?
- e) A three-phase cage induction motor is started by direct-on-line (DOL) switching at the rated voltage. If the starting current drawn is 6 times the full load current, and the full load slip is 4%, then calculate the ratio of the starting developed torque to the full load torque?
- f) Explain induction motor as an induction generator and its limitations.

**Q.3 Attempt any two of the following. 12**

- a) Explain speed control of IM by pole changing & emf injection method.
- b) A 746 KW, 3 Ph, 50 Hz, 16 pole Induction Motor has a rotor impedance of  $(0.02 + j0.15)\Omega$  at standstill. Full load torque is obtained at 360 rpm. Calculate:
  - i) The ratio of the Max to Full load torque
  - ii) The speed of Max torque and
  - iii) The rotor resistance to be added to get Max starting torque
- c) Draw the circle diagram of a 7.46 KW, 200 V, 50 Hz, 3 Ph slip ring with a star connected stator and rotor, a winding ratio of unity, a stator resistance of 0.38 ohm/phase and a rotor resistance of 0.24 ohm/phase. The following are the test readings.  
 No-load: 220 V, 7.7 A, P.F. = 0.195  
 Short-Circuit: 100 V, 47.6 A, P.F. = 0.454 Find,
  - i) Starting torque
  - ii) Max torque, both in synchronous watts
  - iii) the maximum power factor
  - iv) slip for maximum torque
  - v) the maximum output

**Section – II**

**Q.4 Attempt any four of the following. 16**

- a) Explain why single phase induction motor is not self-started.
- b) Explain with diagram operation of shaded pole induction motor.
- c) Explain the constructional feature of synchronous motor.
- d) Derive EMF equation of alternator with short pitched coils and distributed windings.
- e) Explain working principle of synchronous motor.
- f) State and explain different losses in synchronous motor.

**Q.5 Attempt any two of the following. 12**

- a) Define and derive expression for pitch factor and distribution factor in case of alternator.
- b) Explain MMF method of calculating voltage regulation of an alternator when power factor is lagging.
- c) Why synchronous motor is not self-started? Explain different methods of starting of synchronous motor.

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**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**

**ELECTRICAL ENGINEERING**

**Electrical Machines – II (BTN07402)**

Day & Date: Wednesday, 22-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:**
- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
  - 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
  - 3) Figures to the right indicates full marks.
  - 4) Assume data wherever necessary

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose correct answer.**

**14**

- 1) In squirrel cage I.M. torque with autotransformer starter is \_\_\_\_\_ times the torque with direct switching.
 

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| a) $K^2$ | b) $1/K$             |
| c) $K$   | d) None of the above |
- 2) Regarding skewing of motor bars in a squirrel cage induction motor, which statement is false?
  - a) It prevents cogging
  - b) It increases starting torque
  - c) It produces more uniform torque
  - d) It reduces motor 'hum' during its operation
- 3) What type of operations are used in the starting (auxiliary) switches in a single-phase induction motor?
  - a) mechanical operation
  - b) electrical operation
  - c) centrifugal operation and mechanical operation
  - d) centrifugal operation
- 4) In a shaded pole single-phase motor, the revolving field is produced by the use of \_\_\_\_\_.
 

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| a) Inductor | b) Capacitor     |
| c) Resistor | d) Shading coils |
- 5) What is the coil span for a 2 pole 18 slot machine?
 

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| a) 9  | b) 4.5 |
| c) 18 | d) 6   |
- 6) Armature reaction in an alternator primarily affects \_\_\_\_\_.
  - a) rotor speed
  - b) terminal voltage per phase
  - c) frequency of armature current
  - d) generated voltage per phase

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**Set S**

**S. Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Electrical Machines – II (BTN07402)**

Day & Date: Wednesday, 22-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Assume suitable data if necessary.  
 4) Draw neat diagrams whenever necessary.

**Section – I****Q.2 Attempt any four of the following.****16**

- Explain how rotating magnetic field is created when 3 Ph supply voltage is given to the 3 Ph stator winding.
- Compare squirrel cage and slip ring Induction Motor with respect to construction, performance parameters and cost.
- With a neat sketch explain the DOL starter.
- A 400 V, 50 Hz 30 hp, three-phase induction motor is drawing 50 A current at 0.8 power factor lagging. The stator and rotor copper losses are 1.5 kW and 900 W respectively. The friction and windage losses are 1050 W and the core losses are 1200 W. Calculate the air-gap power of the motor?
- A three-phase cage induction motor is started by direct-on-line (DOL) switching at the rated voltage. If the starting current drawn is 6 times the full load current, and the full load slip is 4%, then calculate the ratio of the starting developed torque to the full load torque?
- Explain induction motor as an induction generator and its limitations.

**Q.3 Attempt any two of the following.****12**

- Explain speed control of IM by pole changing & emf injection method.
- A 746 KW, 3 Ph, 50 Hz, 16 pole Induction Motor has a rotor impedance of  $(0.02 + j0.15)\Omega$  at standstill. Full load torque is obtained at 360 rpm. Calculate:
  - The ratio of the Max to Full load torque
  - The speed of Max torque and
  - The rotor resistance to be added to get Max starting torque
- Draw the circle diagram of a 7.46 KW, 200 V, 50 Hz, 3 Ph slip ring with a star connected stator and rotor, a winding ratio of unity, a stator resistance of 0.38 ohm/phase and a rotor resistance of 0.24 ohm/phase. The following are the test readings.  
 No-load: 220 V, 7.7 A, P.F. = 0.195  
 Short-Circuit: 100 V, 47.6 A, P.F. = 0.454 Find,
  - Starting torque
  - Max torque, both in synchronous watts
  - the maximum power factor
  - slip for maximum torque
  - the maximum output

**Section – II**

**Q.4 Attempt any four of the following. 16**

- a) Explain why single phase induction motor is not self-started.
- b) Explain with diagram operation of shaded pole induction motor.
- c) Explain the constructional feature of synchronous motor.
- d) Derive EMF equation of alternator with short pitched coils and distributed windings.
- e) Explain working principle of synchronous motor.
- f) State and explain different losses in synchronous motor.

**Q.5 Attempt any two of the following. 12**

- a) Define and derive expression for pitch factor and distribution factor in case of alternator.
- b) Explain MMF method of calculating voltage regulation of an alternator when power factor is lagging.
- c) Why synchronous motor is not self-started? Explain different methods of starting of synchronous motor.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System II (BTN07403)**

Day & Date: Friday, 24-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternative from the options.**

**14**

- 1) The sag of transmission line is least affected owing to \_\_\_\_\_.  
 a) weight of conductor  
 b) current through the conductor  
 c) temperature  
 d) Ice deposited on the conductor
- 2) Corona usually occurs when the electrostatic stress in the air around the conductor succeeds \_\_\_\_\_.  
 a) 30 kV (maximum value)/cm      b) 22 kV (maximum value)/cm  
 c) 11 kV (rms value)/cm      d) 6.6 kV (rms value)/cm
- 3) The effect of corona is \_\_\_\_\_.  
 a) increased energy loss      b) increased reactance  
 c) increased inductance      d) none of these
- 4) The operating voltage of high Tension cables is up to \_\_\_\_\_.  
 a) 1.1 kV      b) 6.6 kV  
 c) 3.3 kV      d) 11 kV
- 5) The process of achieving uniformity in the dielectric stress by using layers of different dielectrics is known as \_\_\_\_\_.  
 a) Stranding process      b) Grading of cables  
 c) Stress distribution      d) Capacitance grading
- 6) The skin effect increases \_\_\_\_\_.  
 a) Resistance of line      b) Inductance of line  
 c) Capacitance of line      d) Voltage of line
- 7) By using which conductor is the skin effect reduced?  
 a) Bundled conductors      b) Stranded conductors  
 c) Hollow conductors      d) Solid conductors
- 8) Which of the following is correct operating voltage range for short transmission lines?  
 a) Less than 456 KV      b) Less than 132 KV  
 c) Less than 20 KV      d) Less than 100 KV



- 9) In the analysis of which of the following lines shunt capacitance is neglected?
  - a) Short transmission line
  - b) Medium transmission line
  - c) Long transmission line
  - d) Medium as well as long transmission lines
- 10) In any transmission line, the constants  $\vec{A}$  and  $\vec{D}$  are \_\_\_\_\_.
  - a) Dimensionless
  - b) Ohms and Siemen
  - c) Mega ohm and volts
  - d) Volt and ampere
- 11) In a substation the following equipment is not installed \_\_\_\_\_.
  - a) Exciters
  - b) Series capacitors
  - c) Shunt reactors
  - d) Voltage transformers
- 12) In a transmission system the feeder supplies power to \_\_\_\_\_.
  - a) Transformer substations
  - b) Service mains
  - c) Distributors
  - d) All of these
- 13) Distributor is designed mainly from the point of view of \_\_\_\_\_.
  - a) Its current carrying capacity
  - b) Voltage drop in it
  - c) Operating voltage
  - d) Operating Frequency
- 14) Which of the following are the methods of grounding?
  - a) Resistance
  - b) Reactance
  - c) Solid
  - d) All of these

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**Set P**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System II (BTN07403)**

Day & Date: Friday, 24-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figure to the right indicate full marks.

**Section – I**

**Q.2 Solve any Four of the Following. 16**

- a) What is meant by sag? Derive an expression for sag in a transmission line having equal level of supports.
- b) A single core cable has a conductor diameter of 1 cm & intersheath diameter of 1.8 cm. If the impregnated paper of relative permittivity 3 is used as insulation, calculate the capacitance for 1 km length of cable.
- c) Explain in detail skin effect & proximity effect
- d) A 132 kv transmission line has the following data:  
Weight of conductor = 680 kg/m, span length = 260 m, ultimate strength = 3100kg, safety factor = 2. Calculate the height above the ground at which conductor is supported. Ground clearance required is 10 m.
- e) Draw and explain the construction of cable with all layers.
- f) Derive the expression for capacitance of single phase two wire line.

**Q.3 Solve any Two of the Following. 12**

- a) An overhead transmission line at a river crossing is supported from two towers at heights of 50 m and 100 m above water level, the horizontal distance between the towers being 400m. If the maximum allowable tension is 1800 kg. Find the clearance between the conductor and water at a point midway between the towers. Weight of conductor is 1 kg/m.
- b) Derive the expression for inductance of single phase two wire line.
- c) Derive the expression for:
  - i) Insulation resistance
  - ii) Capacitance of single core cable

**Section – II**

**Q.4 Attempt any Four of the Following. 16**

- a) Derive the generalized circuit constant for medium line using nominal T-method.
- b) Explain different equipment used in substation.
- c) Describe with diagram.
  - i) Radial system
  - ii) Ring main system
  - iii) Interconnected system

- d) A 3-phase, 50Hz, 100 km line has a following constant
- i) Resistance/km/phase =  $0.1 \Omega$
  - ii) Inductive reactance/km/phase =  $0.2 \Omega$
  - iii) Capacitive susceptance/km/phase =  $0.04 \times 10^{-6} S$ . Determine the sending end voltage and current when supplying balanced load of 10,000 KW at 66 KV, p.f 0.8 lagging. Use Nominal T method.
- e) Draw and explain concentrated loaded DC distributor fed at Both end.
- f) Write short note on resistance & Solid grounding.

**Q.5 Attempt any Two of the Following.****12**

- a) Explain the analysis of long transmission line using rigorous method.
- b) A (medium) single phase transmission line 80 km long has the following constants:  
Resistance/km =  $0.3125 \Omega$ ,  
reactance/km =  $0.1 \Omega$ ,  
susceptance/km =  $17.5 \times 10^{-6} S$   
Receiving end line voltage = 66KV. Assuming that the total capacitance of the line is localized at the receiving end alone, determine:  
(i) The sending end current  
(ii) sending end voltage  
(iii) regulation and  
(iv) sending end power factor.  
The line is delivering 15 MW at 0.8 power factor lagging.
- c) A single-phase ac distributor AB 300 m long is fed from end A and is loaded 6 as under  
i) 100 A at 0.707 p.f. lagging 200 m from point A  
ii) 200 A at 0.8 p.f. lagging 300 m from point A  
The load resistance and reactance of distributor is 0.2 ohms and 0.1 ohms per km. Calculate the voltage drop in the distributor. The load power factors refer to the voltage at far end.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System II (BTN07403)**

Day & Date: Friday, 24-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternative from the options. 14**

- 1) Which of the following is correct operating voltage range for short transmission lines?
  - a) Less than 456 KV
  - b) Less than 132 KV
  - c) Less than 20 KV
  - d) Less than 100 KV
- 2) In the analysis of which of the following lines shunt capacitance is neglected?
  - a) Short transmission line
  - b) Medium transmission line
  - c) Long transmission line
  - d) Medium as well as long transmission lines
- 3) In any transmission line, the constants  $\vec{A}$  and  $\vec{D}$  are \_\_\_\_\_.
  - a) Dimensionless
  - b) Ohms and Siemen
  - c) Mega ohm and volts
  - d) Volt and ampere
- 4) In a substation the following equipment is not installed \_\_\_\_\_.
  - a) Exciters
  - b) Series capacitors
  - c) Shunt reactors
  - d) Voltage transformers
- 5) In a transmission system the feeder supplies power to \_\_\_\_\_.
  - a) Transformer substations
  - b) Service mains
  - c) Distributors
  - d) All of these
- 6) Distributor is designed mainly from the point of view of \_\_\_\_\_.
  - a) Its current carrying capacity
  - b) Voltage drop in it
  - c) Operating voltage
  - d) Operating Frequency
- 7) Which of the following are the methods of grounding?
  - a) Resistance
  - b) Reactance
  - c) Solid
  - d) All of these

- 8) The sag of transmission line is least affected owing to \_\_\_\_\_.  
a) weight of conductor  
b) current through the conductor  
c) temperature  
d) Ice deposited on the conductor
- 9) Corona usually occurs when the electrostatic stress in the air around the conductor succeeds \_\_\_\_\_.  
a) 30 kV (maximum value)/cm      b) 22 kV (maximum value)/cm  
c) 11 kV (rms value)/cm      d) 6.6 kV (rms value)/cm
- 10) The effect of corona is \_\_\_\_\_.  
a) increased energy loss      b) increased reactance  
c) increased inductance      d) none of these
- 11) The operating voltage of high Tension cables is up to \_\_\_\_\_.  
a) 1.1 kV      b) 6.6 kV  
c) 3.3 kV      d) 11 kV
- 12) The process of achieving uniformity in the dielectric stress by using layers of different dielectrics is known as \_\_\_\_\_.  
a) Stranding process      b) Grading of cables  
c) Stress distribution      d) Capacitance grading
- 13) The skin effect increases \_\_\_\_\_.  
a) Resistance of line      b) Inductance of line  
c) Capacitance of line      d) Voltage of line
- 14) By using which conductor is the skin effect reduced?  
a) Bundled conductors      b) Stranded conductors  
c) Hollow conductors      d) Solid conductors

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**Set Q**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System II (BTN07403)**

Day & Date: Friday, 24-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figure to the right indicate full marks.

**Section – I**

**Q.2 Solve any Four of the Following. 16**

- a) What is meant by sag? Derive an expression for sag in a transmission line having equal level of supports.
- b) A single core cable has a conductor diameter of 1 cm & intersheath diameter of 1.8 cm. If the impregnated paper of relative permittivity 3 is used as insulation, calculate the capacitance for 1 km length of cable.
- c) Explain in detail skin effect & proximity effect
- d) A 132 kv transmission line has the following data:  
Weight of conductor = 680 kg/m, span length = 260 m, ultimate strength = 3100kg, safety factor = 2. Calculate the height above the ground at which conductor is supported. Ground clearance required is 10 m.
- e) Draw and explain the construction of cable with all layers.
- f) Derive the expression for capacitance of single phase two wire line.

**Q.3 Solve any Two of the Following. 12**

- a) An overhead transmission line at a river crossing is supported from two towers at heights of 50 m and 100 m above water level, the horizontal distance between the towers being 400m. If the maximum allowable tension is 1800 kg. Find the clearance between the conductor and water at a point midway between the towers. Weight of conductor is 1 kg/m.
- b) Derive the expression for inductance of single phase two wire line.
- c) Derive the expression for:
  - i) Insulation resistance
  - ii) Capacitance of single core cable

**Section – II**

**Q.4 Attempt any Four of the Following. 16**

- a) Derive the generalized circuit constant for medium line using nominal T-method.
- b) Explain different equipment used in substation.
- c) Describe with diagram.
  - i) Radial system
  - ii) Ring main system
  - iii) Interconnected system

- d) A 3-phase, 50Hz, 100 km line has a following constant
- i) Resistance/km/phase =  $0.1 \Omega$
  - ii) Inductive reactance/km/phase =  $0.2 \Omega$
  - iii) Capacitive susceptance/km/phase =  $0.04 \times 10^{-6} S$ . Determine the sending end voltage and current when supplying balanced load of 10,000 KW at 66 KV, p.f 0.8 lagging. Use Nominal T method.
- e) Draw and explain concentrated loaded DC distributor fed at Both end.
- f) Write short note on resistance & Solid grounding.

**Q.5 Attempt any Two of the Following.****12**

- a) Explain the analysis of long transmission line using rigorous method.
- b) A (medium) single phase transmission line 80 km long has the following constants:  
Resistance/km =  $0.3125 \Omega$ ,  
reactance/km =  $0.1 \Omega$ ,  
susceptance/km =  $17.5 \times 10^{-6} S$   
Receiving end line voltage = 66KV. Assuming that the total capacitance of the line is localized at the receiving end alone, determine:  
(i) The sending end current  
(ii) sending end voltage  
(iii) regulation and  
(iv) sending end power factor.  
The line is delivering 15 MW at 0.8 power factor lagging.
- c) A single-phase ac distributor AB 300 m long is fed from end A and is loaded 6 as under  
i) 100 A at 0.707 p.f. lagging 200 m from point A  
ii) 200 A at 0.8 p.f. lagging 300 m from point A  
The load resistance and reactance of distributor is 0.2 ohms and 0.1 ohms per km. Calculate the voltage drop in the distributor. The load power factors refer to the voltage at far end.

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Day & Date: Friday, 24-05-2024  
Time: 10:00 AM To 01:00 PM

**Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
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3) Figures to the right indicates full marks.

Marks: 14

## 14

- Page 9 of 16



- 9) The process of achieving uniformity in the dielectric stress by using layers of different dielectrics is known as \_\_\_\_\_.  
a) Stranding process                      b) Grading of cables  
c) Stress distribution                      d) Capacitance grading
- 10) The skin effect increases \_\_\_\_\_.  
a) Resistance of line                      b) Inductance of line  
c) Capacitance of line                      d) Voltage of line
- 11) By using which conductor is the skin effect reduced?  
a) Bundled conductors                      b) Stranded conductors  
c) Hollow conductors                      d) Solid conductors
- 12) Which of the following is correct operating voltage range for short transmission lines?  
a) Less than 456 KV                      b) Less than 132 KV  
c) Less than 20 KV                      d) Less than 100 KV
- 13) In the analysis of which of the following lines shunt capacitance is neglected?  
a) Short transmission line  
b) Medium transmission line  
c) Long transmission line  
d) Medium as well as long transmission lines
- 14) In any transmission line, the constants  $\vec{A}$  and  $\vec{D}$  are \_\_\_\_\_.  
a) Dimensionless                      b) Ohms and Siemen  
c) Mega ohm and volts                      d) Volt and ampere

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**Set R**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System II (BTN07403)**

Day & Date: Friday, 24-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figure to the right indicate full marks.

**Section – I**

**Q.2 Solve any Four of the Following. 16**

- a) What is meant by sag? Derive an expression for sag in a transmission line having equal level of supports.
- b) A single core cable has a conductor diameter of 1 cm & intersheath diameter of 1.8 cm. If the impregnated paper of relative permittivity 3 is used as insulation, calculate the capacitance for 1 km length of cable.
- c) Explain in detail skin effect & proximity effect
- d) A 132 kv transmission line has the following data:  
Weight of conductor = 680 kg/m, span length = 260 m, ultimate strength = 3100kg, safety factor = 2. Calculate the height above the ground at which conductor is supported. Ground clearance required is 10 m.
- e) Draw and explain the construction of cable with all layers.
- f) Derive the expression for capacitance of single phase two wire line.

**Q.3 Solve any Two of the Following. 12**

- a) An overhead transmission line at a river crossing is supported from two towers at heights of 50 m and 100 m above water level, the horizontal distance between the towers being 400m. If the maximum allowable tension is 1800 kg. Find the clearance between the conductor and water at a point midway between the towers. Weight of conductor is 1 kg/m.
- b) Derive the expression for inductance of single phase two wire line.
- c) Derive the expression for:
  - i) Insulation resistance
  - ii) Capacitance of single core cable

**Section – II**

**Q.4 Attempt any Four of the Following. 16**

- a) Derive the generalized circuit constant for medium line using nominal T-method.
- b) Explain different equipment used in substation.
- c) Describe with diagram.
  - i) Radial system
  - ii) Ring main system
  - iii) Interconnected system

- d) A 3-phase, 50Hz, 100 km line has a following constant
- i) Resistance/km/phase =  $0.1 \Omega$
  - ii) Inductive reactance/km/phase =  $0.2 \Omega$
  - iii) Capacitive susceptance/km/phase =  $0.04 \times 10^{-6} S$ . Determine the sending end voltage and current when supplying balanced load of 10,000 KW at 66 KV, p.f 0.8 lagging. Use Nominal T method.
- e) Draw and explain concentrated loaded DC distributor fed at Both end.
- f) Write short note on resistance & Solid grounding.

**Q.5 Attempt any Two of the Following.****12**

- a) Explain the analysis of long transmission line using rigorous method.
- b) A (medium) single phase transmission line 80 km long has the following constants:  
 Resistance/km =  $0.3125 \Omega$ ,  
 reactance/km =  $0.1 \Omega$ ,  
 susceptance/km =  $17.5 \times 10^{-6} S$   
 Receiving end line voltage = 66KV. Assuming that the total capacitance of the line is localized at the receiving end alone, determine:  
 (i) The sending end current  
 (ii) sending end voltage  
 (iii) regulation and  
 (iv) sending end power factor.  
 The line is delivering 15 MW at 0.8 power factor lagging.
- c) A single-phase ac distributor AB 300 m long is fed from end A and is loaded 6 as under  
 i) 100 A at 0.707 p.f. lagging 200 m from point A  
 ii) 200 A at 0.8 p.f. lagging 300 m from point A  
 The load resistance and reactance of distributor is 0.2 ohms and 0.1 ohms per km. Calculate the voltage drop in the distributor. The load power factors refer to the voltage at far end.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System II (BTN07403)**

Day & Date: Friday, 24-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct alternative from the options.**

**14**

- 1) The skin effect increases \_\_\_\_\_.  
 a) Resistance of line                      b) Inductance of line  
 c) Capacitance of line                      d) Voltage of line
- 2) By using which conductor is the skin effect reduced?  
 a) Bundled conductors                      b) Stranded conductors  
 c) Hollow conductors                      d) Solid conductors
- 3) Which of the following is correct operating voltage range for short transmission lines?  
 a) Less than 456 KV                      b) Less than 132 KV  
 c) Less than 20 KV                      d) Less than 100 KV
- 4) In the analysis of which of the following lines shunt capacitance is neglected?  
 a) Short transmission line  
 b) Medium transmission line  
 c) Long transmission line  
 d) Medium as well as long transmission lines
- 5) In any transmission line, the constants  $\vec{A}$  and  $\vec{D}$  are \_\_\_\_\_.  
 a) Dimensionless                      b) Ohms and Siemen  
 c) Mega ohm and volts                      d) Volt and ampere
- 6) In a substation the following equipment is not installed \_\_\_\_\_.  
 a) Exciters                      b) Series capacitors  
 c) Shunt reactors                      d) Voltage transformers
- 7) In a transmission system the feeder supplies power to \_\_\_\_\_.  
 a) Transformer substations                      b) Service mains  
 c) Distributors                      d) All of these
- 8) Distributor is designed mainly from the point of view of \_\_\_\_\_.  
 a) Its current carrying capacity  
 b) Voltage drop in it  
 c) Operating voltage  
 d) Operating Frequency

- 9) Which of the following are the methods of grounding?
  - a) Resistance
  - b) Reactance
  - c) Solid
  - d) All of these
- 10) The sag of transmission line is least affected owing to \_\_\_\_\_.
  - a) weight of conductor
  - b) current through the conductor
  - c) temperature
  - d) Ice deposited on the conductor
- 11) Corona usually occurs when the electrostatic stress in the air around the conductor succeeds \_\_\_\_\_.
  - a) 30 kV (maximum value)/cm
  - b) 22 kV (maximum value)/cm
  - c) 11 kV (rms value)/cm
  - d) 6.6 kV (rms value)/cm
- 12) The effect of corona is \_\_\_\_\_.
  - a) increased energy loss
  - b) increased reactance
  - c) increased inductance
  - d) none of these
- 13) The operating voltage of high Tension cables is up to \_\_\_\_\_.
  - a) 1.1 kV
  - b) 6.6 kV
  - c) 3.3 kV
  - d) 11 kV
- 14) The process of achieving uniformity in the dielectric stress by using layers of different dielectrics is known as \_\_\_\_\_.
  - a) Stranding process
  - b) Grading of cables
  - c) Stress distribution
  - d) Capacitance grading

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**Set S**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Power System II (BTN07403)**

Day & Date: Friday, 24-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
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**Section – I**

**Q.2 Solve any Four of the Following. 16**

- a) What is meant by sag? Derive an expression for sag in a transmission line having equal level of supports.
- b) A single core cable has a conductor diameter of 1 cm & intersheath diameter of 1.8 cm. If the impregnated paper of relative permittivity 3 is used as insulation, calculate the capacitance for 1 km length of cable.
- c) Explain in detail skin effect & proximity effect
- d) A 132 kv transmission line has the following data:  
Weight of conductor = 680 kg/m, span length = 260 m, ultimate strength = 3100kg, safety factor = 2. Calculate the height above the ground at which conductor is supported. Ground clearance required is 10 m.
- e) Draw and explain the construction of cable with all layers.
- f) Derive the expression for capacitance of single phase two wire line.

**Q.3 Solve any Two of the Following. 12**

- a) An overhead transmission line at a river crossing is supported from two towers at heights of 50 m and 100 m above water level, the horizontal distance between the towers being 400m. If the maximum allowable tension is 1800 kg. Find the clearance between the conductor and water at a point midway between the towers. Weight of conductor is 1 kg/m.
- b) Derive the expression for inductance of single phase two wire line.
- c) Derive the expression for:
  - i) Insulation resistance
  - ii) Capacitance of single core cable

**Section – II**

**Q.4 Attempt any Four of the Following. 16**

- a) Derive the generalized circuit constant for medium line using nominal T-method.
- b) Explain different equipment used in substation.
- c) Describe with diagram.
  - i) Radial system
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  - iii) Interconnected system

- d) A 3-phase, 50Hz, 100 km line has a following constant
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- a) Explain the analysis of long transmission line using rigorous method.
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The load resistance and reactance of distributor is 0.2 ohms and 0.1 ohms per km. Calculate the voltage drop in the distributor. The load power factors refer to the voltage at far end.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**

**ELECTRICAL ENGINEERING**

**Analog & Digital Integrated Circuits (BTN07404)**

Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
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**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) Unity gain amplifier is also known as \_\_\_\_\_.  
a) difference amplifier                      b) comparator  
c) single ended                                d) voltage follower
- 2) For an inverting amplifier, if  $R_f = 100k\Omega$  and  $R_i = 1k\Omega$  then closed loop gain is \_\_\_\_\_.  
a) 1,00,000                                      b) -1,000  
c) 101                                                d) -100
- 3) The large signal bandwidth of an op-amp is limited by its \_\_\_\_\_.  
a) loop gain                                        b) slew rate  
c) output impedance                            d) input frequency
- 4) CMRR of a differential amplifier can be improved by increasing \_\_\_\_\_.  
a) Differential voltage gain                    b) Common mode voltage gain  
c) Both a and b                                    d) None of the above
- 5) A differential amplifier is capable of amplifying \_\_\_\_\_.  
a) DC input signal only                        b) AC input signal only  
c) AC & DC input signal                        d) None of the Mentioned
- 6) A feedback amplifier is also called as \_\_\_\_\_.  
a) Open loop amplifier                        b) Closed loop amplifier  
c) Feedback network amplifier                d) Looped network amplifier
- 7) Integration amplifier produces \_\_\_\_\_.  
a) Output waveform as integration of input waveform  
b) Input waveform as integration of output waveform  
c) Output waveform as derivative of input waveform  
d) Input waveform as derivative of output waveform
- 8) Which of the following is NOT considered for forming groups in K-map?  
a) Rolling                                            b) Diagonal  
c) Vertical                                            d) Horizontal



- 9) The Boolean expression  $Y = XY + ZX$  is in the \_\_\_\_\_ form.
  - a) Product-of-Sum
  - b) Sum-of-Products
  - c) Linear
  - d) None of the above
- 10) The flip flop is a \_\_\_\_\_ device.
  - a) Unstable
  - b) Bi-stable
  - c) Both a and b
  - d) None of the above
- 11) Which circuit doesn't have a memory unit?
  - a) Combinational
  - b) Sequential
  - c) Both a and b
  - d) None of the above
- 12) A register is defined as \_\_\_\_\_.
  - a) The group of latches for storing one bit of information
  - b) The group of latches for storing n-bit of information
  - c) The group of flip-flops suitable for storing one bit of information
  - d) The group of flip-flops suitable for storing binary information
- 13) The full form of SIPO is \_\_\_\_\_.
  - a) Serial-in Parallel-out
  - b) Serial in perpendicular out
  - c) Serial-in past out
  - d) Serial-In Peripheral-Out
- 14) Registers capable of shifting in one direction is \_\_\_\_\_.
  - a) Universal shift register
  - b) Unidirectional shift register
  - c) Unipolar shift register
  - d) Unique shift register

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Analog & Digital Integrated Circuits (BTN07404)**

Day & Date: Sunday, 26-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
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**Section – I**

- Q.2 Answer the following (Any Four). 16**
- Explain DC Analysis of differential amplifier (BIBO).
  - Explain the ideal characteristics of op-amp.
  - Explain the concept of virtual ground condition.
  - Explain voltage to current converter with floating load.
  - With neat circuit diagram explain working of integrator.
- Q.3 Answer the Following (Any Two). 12**
- Explain three op amp instrumentation amplifiers.
  - Draw and explain equivalent circuit and ideal voltage transfer curve of op-amp.
  - Derive an expression for input resistance and output resistance for voltage series feedback amplifier.

**Section – II**

- Q.4 Answer the following (Any Four). 16**
- Explain S-R flip-flop with logical diagram and truth table.
  - Differentiate between synchronous and asynchronous counters.
  - Define the following terms in brief.
    - Maxterm
    - Minterm
    - SOP
    - POS
  - Explain full adder in details & realize it using basic logic gates.
  - Explain different modes of shift registers with suitable diagrams.
- Q.5 Answer the Following (Any Two) 12**
- Reduce the following expression using K-map and implement reduced expression by using logic gates  $(A,B,C,D) = \sum m(1,2,5,8,11,13)$
  - Design a D flip-flop using JK flip flop.
  - Design a mod-10 asynchronous down counter using J-K flip flop.

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**

**ELECTRICAL ENGINEERING**

**Analog & Digital Integrated Circuits (BTN07404)**

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**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) Which of the following is NOT considered for forming groups in K-map?
  - a) Rolling
  - b) Diagonal
  - c) Vertical
  - d) Horizontal
- 2) The Boolean expression  $Y = XY + ZX$  is in the \_\_\_\_\_ form.
  - a) Product-of-Sum
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- 3) The flip flop is a \_\_\_\_\_ device.
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- 5) A register is defined as \_\_\_\_\_.
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  - b) Serial in perpendicular out
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- 7) Registers capable of shifting in one direction is \_\_\_\_\_.
  - a) Universal shift register
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  - d) Unique shift register
- 8) Unity gain amplifier is also known as \_\_\_\_\_.
  - a) difference amplifier
  - b) comparator
  - c) single ended
  - d) voltage follower

- 9)** For an inverting amplifier, if  $R_f = 100\text{k}\Omega$  and  $R_i = 1\text{k}\Omega$  then closed loop gain is \_\_\_\_\_.  
a) 1,00,000                      b) -1,000  
c) 101                                d) -100
- 10)** The large signal bandwidth of an op-amp is limited by its \_\_\_\_\_.  
a) loop gain                          b) slew rate  
c) output impedance              d) input frequency
- 11)** CMRR of a differential amplifier can be improved by increasing \_\_\_\_\_.  
a) Differential voltage gain        b) Common mode voltage gain  
c) Both a and b                      d) None of the above
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a) DC input signal only            b) AC input signal only  
c) AC & DC input signal           d) None of the Mentioned
- 13)** A feedback amplifier is also called as \_\_\_\_\_.  
a) Open loop amplifier             b) Closed loop amplifier  
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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Analog & Digital Integrated Circuits (BTN07404)**

Day & Date: Sunday, 26-05-2024  
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Max. Marks: 56

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**Section – I**

- Q.2 Answer the following (Any Four). 16**
- Explain DC Analysis of differential amplifier (BIBO).
  - Explain the ideal characteristics of op-amp.
  - Explain the concept of virtual ground condition.
  - Explain voltage to current converter with floating load.
  - With neat circuit diagram explain working of integrator.
- Q.3 Answer the Following (Any Two). 12**
- Explain three op amp instrumentation amplifiers.
  - Draw and explain equivalent circuit and ideal voltage transfer curve of op-amp.
  - Derive an expression for input resistance and output resistance for voltage series feedback amplifier.

**Section – II**

- Q.4 Answer the following (Any Four). 16**
- Explain S-R flip-flop with logical diagram and truth table.
  - Differentiate between synchronous and asynchronous counters.
  - Define the following terms in brief.
    - Maxterm
    - Minterm
    - SOP
    - POS
  - Explain full adder in details & realize it using basic logic gates.
  - Explain different modes of shift registers with suitable diagrams.
- Q.5 Answer the Following (Any Two) 12**
- Reduce the following expression using K-map and implement reduced expression by using logic gates  $(A,B,C,D) = \sum m(1,2,5,8,11,13)$
  - Design a D flip-flop using JK flip flop.
  - Design a mod-10 asynchronous down counter using J-K flip flop.

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Set **R**

S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024

**ELECTRICAL ENGINEERING****Analog & Digital Integrated Circuits (BTN07404)**

Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.****14**

- 1) Which circuit doesn't have a memory unit?
  - a) Combinational
  - b) Sequential
  - c) Both a and b
  - d) None of the above
- 2) A register is defined as \_\_\_\_\_.
  - a) The group of latches for storing one bit of information
  - b) The group of latches for storing n-bit of information
  - c) The group of flip-flops suitable for storing one bit of information
  - d) The group of flip-flops suitable for storing binary information
- 3) The full form of SIPO is \_\_\_\_\_.
  - a) Serial-in Parallel-out
  - b) Serial in perpendicular out
  - c) Serial-in past out
  - d) Serial-In Peripheral-Out
- 4) Registers capable of shifting in one direction is \_\_\_\_\_.
  - a) Universal shift register
  - b) Unidirectional shift register
  - c) Unipolar shift register
  - d) Unique shift register
- 5) Unity gain amplifier is also known as \_\_\_\_\_.
  - a) difference amplifier
  - b) comparator
  - c) single ended
  - d) voltage follower
- 6) For an inverting amplifier, if  $R_f = 100\text{k}\Omega$  and  $R_i = 1\text{k}\Omega$  then closed loop gain is \_\_\_\_\_.
  - a) 1,00,000
  - b) -1,000
  - c) 101
  - d) -100
- 7) The large signal bandwidth of an op-amp is limited by its \_\_\_\_\_.
  - a) loop gain
  - b) slew rate
  - c) output impedance
  - d) input frequency
- 8) CMRR of a differential amplifier can be improved by increasing \_\_\_\_\_.
  - a) Differential voltage gain
  - b) Common mode voltage gain
  - c) Both a and b
  - d) None of the above
- 9) A differential amplifier is capable of amplifying \_\_\_\_\_.
  - a) DC input signal only
  - b) AC input signal only
  - c) AC & DC input signal
  - d) None of the Mentioned

- 10)** A feedback amplifier is also called as \_\_\_\_\_.  
a) Open loop amplifier                      b) Closed loop amplifier  
c) Feedback network amplifier            d) Looped network amplifier
- 11)** Integration amplifier produces \_\_\_\_\_.  
a) Output waveform as integration of input waveform  
b) Input waveform as integration of output waveform  
c) Output waveform as derivative of input waveform  
d) Input waveform as derivative of output waveform
- 12)** Which of the following is NOT considered for forming groups in K-map?  
a) Rolling                                      b) Diagonal  
c) Vertical                                      d) Horizontal
- 13)** The Boolean expression  $Y = XY + ZX$  is in the \_\_\_\_\_ form.  
a) Product-of-Sum                            b) Sum-of-Products  
c) Linear                                        d) None of the above
- 14)** The flip flop is a \_\_\_\_\_ device.  
a) Unstable                                      b) Bi-stable  
c) Both a and b                                d) None of the above

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Set **R**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Analog & Digital Integrated Circuits (BTN07404)**

Day & Date: Sunday, 26-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Answer the following (Any Four).** **16**

- Explain DC Analysis of differential amplifier (BIBO).
- Explain the ideal characteristics of op-amp.
- Explain the concept of virtual ground condition.
- Explain voltage to current converter with floating load.
- With neat circuit diagram explain working of integrator.

**Q.3 Answer the Following (Any Two).** **12**

- Explain three op amp instrumentation amplifiers.
- Draw and explain equivalent circuit and ideal voltage transfer curve of op-amp.
- Derive an expression for input resistance and output resistance for voltage series feedback amplifier.

**Section – II**

**Q.4 Answer the following (Any Four).** **16**

- Explain S-R flip-flop with logical diagram and truth table.
- Differentiate between synchronous and asynchronous counters.
- Define the following terms in brief.
  - Maxterm
  - Minterm
  - SOP
  - POS
- Explain full adder in details & realize it using basic logic gates.
- Explain different modes of shift registers with suitable diagrams.

**Q.5 Answer the Following (Any Two)** **12**

- Reduce the following expression using K-map and implement reduced expression by using logic gates  $(A,B,C,D) = \sum m(1,2,5,8,11,13)$
- Design a D flip-flop using JK flip flop.
- Design a mod-10 asynchronous down counter using J-K flip flop.



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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**

**ELECTRICAL ENGINEERING**

**Analog & Digital Integrated Circuits (BTN07404)**

Day & Date: Sunday, 26-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book. Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
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3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) A feedback amplifier is also called as \_\_\_\_\_.  
 a) Open loop amplifier                      b) Closed loop amplifier  
 c) Feedback network amplifier              d) Looped network amplifier
- 2) Integration amplifier produces \_\_\_\_\_.  
 a) Output waveform as integration of input waveform  
 b) Input waveform as integration of output waveform  
 c) Output waveform as derivative of input waveform  
 d) Input waveform as derivative of output waveform
- 3) Which of the following is NOT considered for forming groups in K-map?  
 a) Rolling                                          b) Diagonal  
 c) Vertical                                          d) Horizontal
- 4) The Boolean expression  $Y = XY + ZX$  is in the \_\_\_\_\_ form.  
 a) Product-of-Sum                              b) Sum-of-Products  
 c) Linear                                              d) None of the above
- 5) The flip flop is a \_\_\_\_\_ device.  
 a) Unstable                                          b) Bi-stable  
 c) Both a and b                                      d) None of the above
- 6) Which circuit doesn't have a memory unit?  
 a) Combinational                                b) Sequential  
 c) Both a and b                                      d) None of the above
- 7) A register is defined as \_\_\_\_\_.  
 a) The group of latches for storing one bit of information  
 b) The group of latches for storing n-bit of information  
 c) The group of flip-flops suitable for storing one bit of information  
 d) The group of flip-flops suitable for storing binary information
- 8) The full form of SIPO is \_\_\_\_\_.  
 a) Serial-in Parallel-out                        b) Serial in perpendicular out  
 c) Serial-in past out                              d) Serial-In Peripheral-Out

- 9) Registers capable of shifting in one direction is \_\_\_\_\_.  
a) Universal shift register                      b) Unidirectional shift register  
c) Unipolar shift register                      d) Unique shift register
- 10) Unity gain amplifier is also known as \_\_\_\_\_.  
a) difference amplifier                      b) comparator  
c) single ended                      d) voltage follower
- 11) For an inverting amplifier, if  $R_f = 100\text{k}\Omega$  and  $R_i = 1\text{k}\Omega$  then closed loop gain is \_\_\_\_\_.  
a) 1,00,000                      b) -1,000  
c) 101                      d) -100
- 12) The large signal bandwidth of an op-amp is limited by its \_\_\_\_\_.  
a) loop gain                      b) slew rate  
c) output impedance                      d) input frequency
- 13) CMRR of a differential amplifier can be improved by increasing \_\_\_\_\_.  
a) Differential voltage gain                      b) Common mode voltage gain  
c) Both a and b                      d) None of the above
- 14) A differential amplifier is capable of amplifying \_\_\_\_\_.  
a) DC input signal only                      b) AC input signal only  
c) AC & DC input signal                      d) None of the Mentioned

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Analog & Digital Integrated Circuits (BTN07404)**

Day & Date: Sunday, 26-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

- Q.2 Answer the following (Any Four). 16**
- Explain DC Analysis of differential amplifier (BIBO).
  - Explain the ideal characteristics of op-amp.
  - Explain the concept of virtual ground condition.
  - Explain voltage to current converter with floating load.
  - With neat circuit diagram explain working of integrator.
- Q.3 Answer the Following (Any Two). 12**
- Explain three op amp instrumentation amplifiers.
  - Draw and explain equivalent circuit and ideal voltage transfer curve of op-amp.
  - Derive an expression for input resistance and output resistance for voltage series feedback amplifier.

**Section – II**

- Q.4 Answer the following (Any Four). 16**
- Explain S-R flip-flop with logical diagram and truth table.
  - Differentiate between synchronous and asynchronous counters.
  - Define the following terms in brief.
    - Maxterm
    - Minterm
    - SOP
    - POS
  - Explain full adder in details & realize it using basic logic gates.
  - Explain different modes of shift registers with suitable diagrams.
- Q.5 Answer the Following (Any Two) 12**
- Reduce the following expression using K-map and implement reduced expression by using logic gates  $(A,B,C,D) = \sum m(1,2,5,8,11,13)$
  - Design a D flip-flop using JK flip flop.
  - Design a mod-10 asynchronous down counter using J-K flip flop.



- 4) Superposition theorem is not applicable to network containing \_\_\_\_\_.  
 a) nonlinear elements                      b) dependent voltage source  
 c) dependent current source              d) Transformers
- 5) The graph of a network has six branches with three tree branches. The minimum number of equations required for the solution of the network is \_\_\_\_\_.  
 a) 3                                                      b) 4  
 c) 12                                                    d) 5
- 6) According to the linear graph theory, the number of possible trees is always equal to the determinant of product of \_\_\_\_\_.  
 a) Only complete incidence matrix  
 b) Reduced incidence matrix & its transpose  
 c) Cut-set matrix  
 d) Tie-set matrix
- 7) Two networks are said to be Dual of each other when \_\_\_\_\_.  
 a) Mesh equations of one network are same as the mesh equations of the other.  
 b) Node equations of one network are same as the node equations of the other  
 c) Mesh equations of one network are same as the node equations of the other.  
 d) None of the above
- 8) In RLC series circuit  $R = 2\Omega$ ,  $L = 2\text{mH}$  and  $C = 1\mu\text{F}$ . Find the time constant of the circuit?  
 a)  $1\mu\text{sec}$                                               b)  $2\text{msec}$   
 c)  $2\mu\text{sec}$                                               d)  $4\text{msec}$
- 9) In RLC circuit, if  $\alpha > \omega$  then the current gives \_\_\_\_\_.  
 a) Critically damped response              b) Over-damped response  
 c) Under-damped response                  d) None of the Above
- 10) The s-domain equivalent of the capacitor reduces to a capacitor with impedance?  
 a)  $sC$                                                       b)  $C$   
 c)  $1/C$                                                     d)  $1/sC$
- 11) The LT of cosine hyperbolic function  $\cosh wt$  is \_\_\_\_\_.  
 a)  $W/(S^2 + W^2)$                                   b)  $W/(S^2 - W^2)$   
 c)  $s/(S^2 + W^2)$                                       d)  $S/(S^2 - W^2)$
- 12) Condition of reciprocity in Y-parameter representation is \_\_\_\_\_.  
 a)  $Y_{11} = Y_{12}$                                       b)  $Y_{12} = Y_{21}$   
 c)  $Y_{11} = Y_{22}$                                       d)  $Y_{12} = Y_{22}$
- 13) What does the connectivity of energy source at the port of network known as?  
 a) Driving Point                                      b) Transfer Point  
 c) Both a) and b)                                      d) none of the above
- 14) The Z-matrix of a two port network is given by  $[0.90.2; 0.20.6]$ . What is the value of  $Y_{22}$ ?  
 a) 1.8                                                      b) 0.27  
 c) 0.9                                                      d) 3.6

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**S.Y. (B.Tech.) (Sem - II) (New)(CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Network Analysis (BTN07405)**

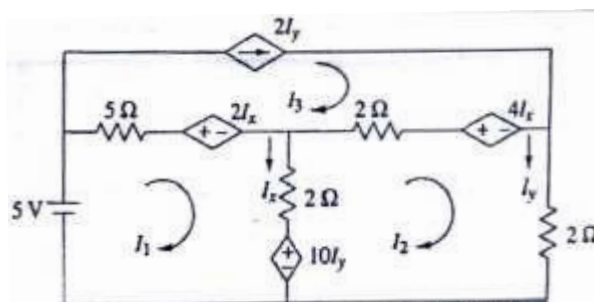
Day & Date: Tuesday, 28-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

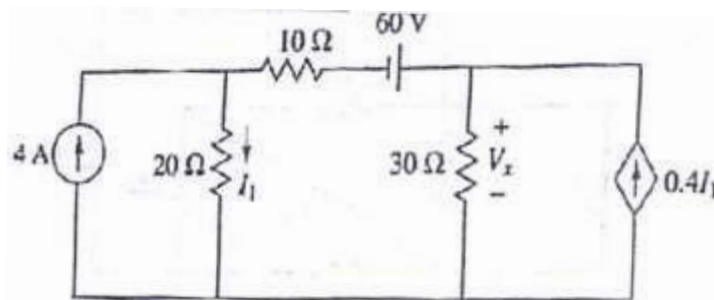
**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section –I****Q.2 Attempt any Four.****16**

a) Find  $I_x$  and  $I_y$  by using mesh analysis method.



b) Find the voltage  $V_x$  by using superposition Theorem.



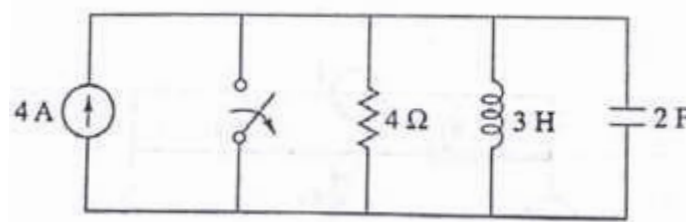
c) The incidence matrix is given as follows:

**Branches →**

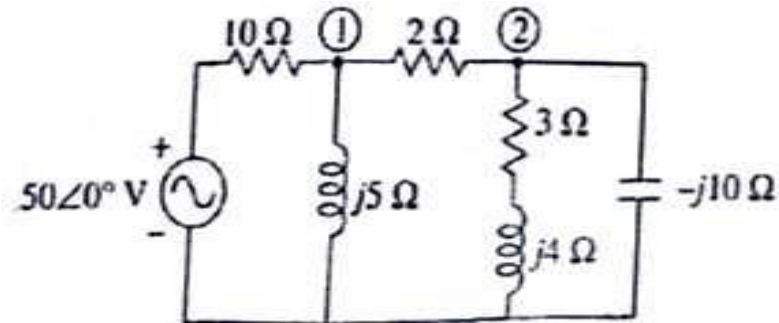
|   | 1  | 2  | 3  | 4  | 5 | 6 | 7 | 8 |
|---|----|----|----|----|---|---|---|---|
| 1 | -1 | -1 | 0  | 0  | 0 | 0 | 1 | 0 |
| 2 | 0  | 1  | 1  | 0  | 1 | 0 | 0 | 0 |
| 3 | 0  | 0  | -1 | -1 | 0 | 1 | 0 | 0 |
| 4 | 1  | 0  | 0  | 1  | 0 | 0 | 0 | 1 |

Draw oriented graph and write tieset matrix.

- d) Draw the dual of the network.



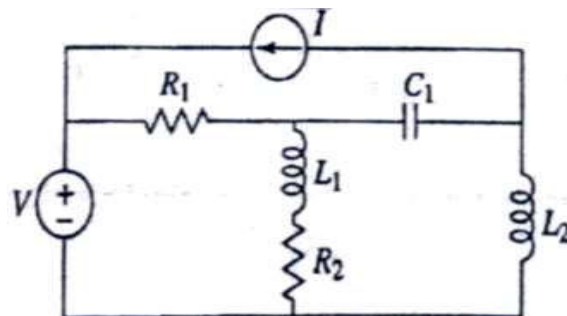
- e) Find  $V_1$  and  $V_2$ .



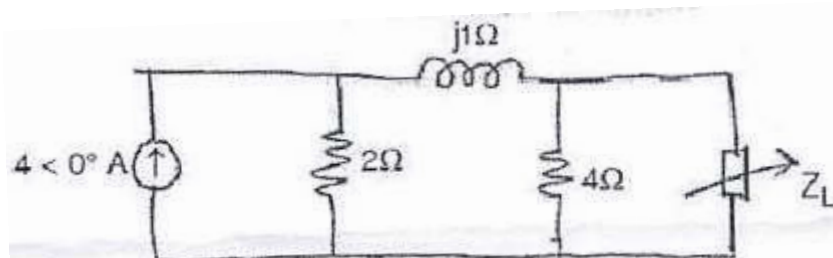
### Q.3 Attempt Any Two.

12

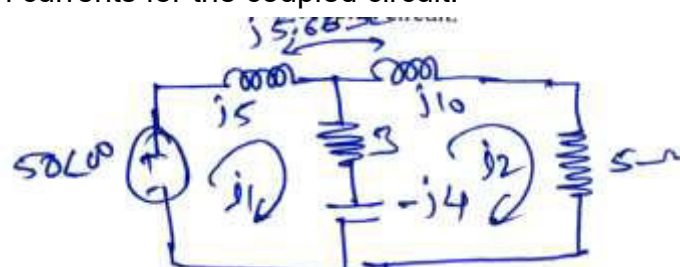
- a) For the given network find incidence matrix, tie set matrix and f-cut set matrix.



- b) Determine the load  $Z_L$  required to be connected in the network for Maximum Power Transfer Theorem. Determine the maximum power drawn:



- c) Find the such currents for the coupled circuit.

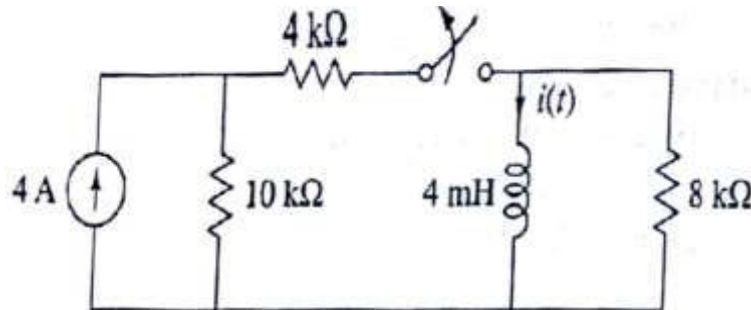


## Section – II

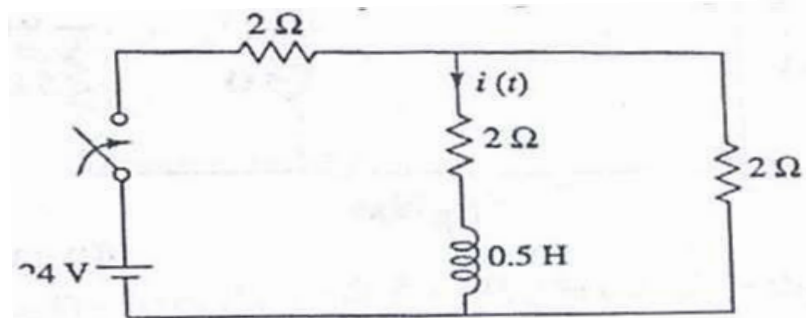
16

## Q.4 Attempt Any Four:

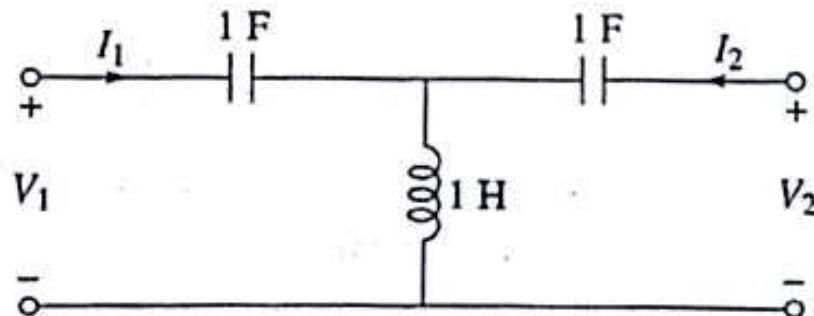
- a) In the network shown in fig is under steady state condition. At  $t=0$  the switch is closed obtain the expression for  $i(t)$ .



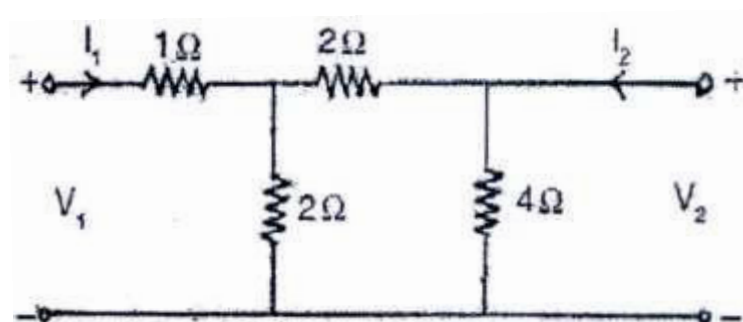
- b) Determine the current  $i(t)$  in the network shown in fig. when the switch is closed at  $t=0$ . The inductor is initially unenergized. Using Laplace transformation method.



- c) Show ABCD parameters for the network shown in fig.



- d) Determine hybrid parameters for the network shown below:

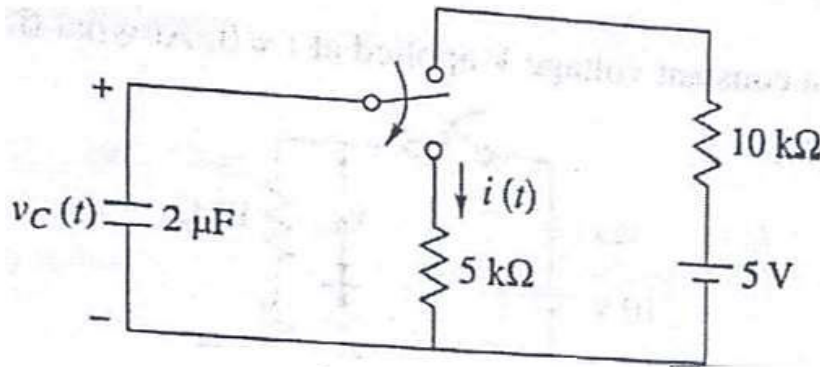


- e) Derive h parameters in terms of z parameter.

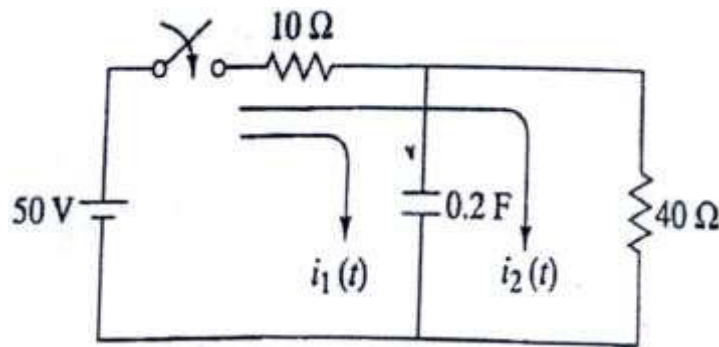


**Q.5 Attempt Any Two.**

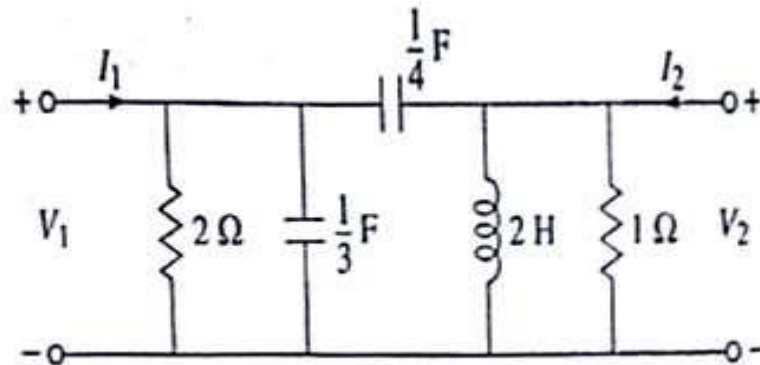
- a) The circuit shown has acquired steady state before switching at  $t = 0$ .
- Obtain  $v_C(0^+)$ ,  $v_C(0^-)$ ,  $i(0^+)$  and  $i(0^-)$ ,
  - Obtain time constant for  $t > 0$ .
  - Find current  $i(t)$  for  $t > 0$



- b) In the network in fig. Find current  $i_1(t)$  and  $i_2(t)$  for  $t > 0$ . Using Laplace transformation method.



- c) Find Y parameters the given network in fig.



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**S.Y. (B.Tech.) (Sem - II) (New)(CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Network Analysis (BTN07405)**

Day & Date: Tuesday, 28-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

**14**

- 1) In RLC series circuit  $R = 2\Omega$ ,  $L = 2\text{mH}$  and  $C = 1\mu\text{F}$ . Find the time constant of the circuit?
  - a)  $1\mu\text{sec}$
  - b)  $2\text{msec}$
  - c)  $2\mu\text{sec}$
  - d)  $4\text{msec}$
- 2) In RLC circuit, if  $\alpha > \omega$  then the current gives \_\_\_\_\_.
  - a) Critically damped response
  - b) Over-damped response
  - c) Under-damped response
  - d) None of the Above
- 3) The s-domain equivalent of the capacitor reduces to a capacitor with impedance?
  - a)  $sC$
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  - c)  $1/C$
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- 4) The LT of cosine hyperbolic function  $\cosh wt$  is \_\_\_\_\_.
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- 5) Condition of reciprocity in Y-parameter representation is \_\_\_\_\_.
  - a)  $Y_{11} = Y_{12}$
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- 7) The Z-matrix of a two port network is given by  $[0.90.2; 0.20.6]$ . What is the value of  $Y_{22}$ ?
  - a) 1.8
  - b) 0.27
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  - d) 3.6

- 

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- Only complete incidence matrix
- Reduced incidence matrix & its transpose
- Cut-set matrix
- Tie-set matrix

- 14)** Two networks are said to be Dual of each other when \_\_\_\_.
- a) Mesh equations of one network are same as the mesh equations of the other.
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  - c) Mesh equations of one network are same as the node equations of the other.
  - d) None of the above

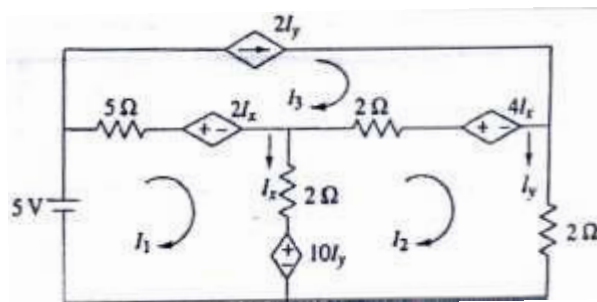
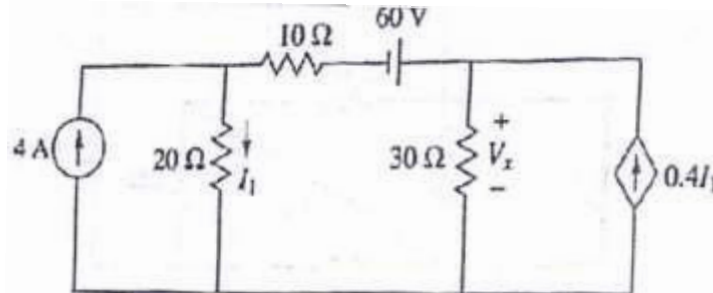
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**S.Y. (B.Tech.) (Sem - II) (New)(CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Network Analysis (BTN07405)**

Day & Date: Tuesday, 28-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

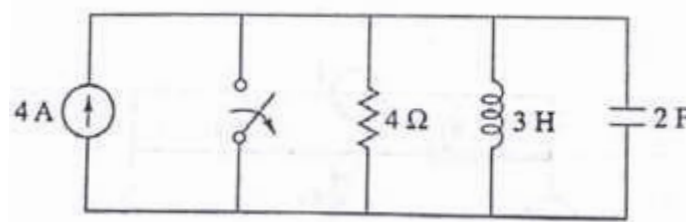
**Section –I****Q.2 Attempt any Four.****16**a) Find  $I_x$  and  $I_y$  by using mesh analysis method.b) Find the voltage  $V_x$  by using superposition Theorem.

c) The incidence matrix is given as follows:

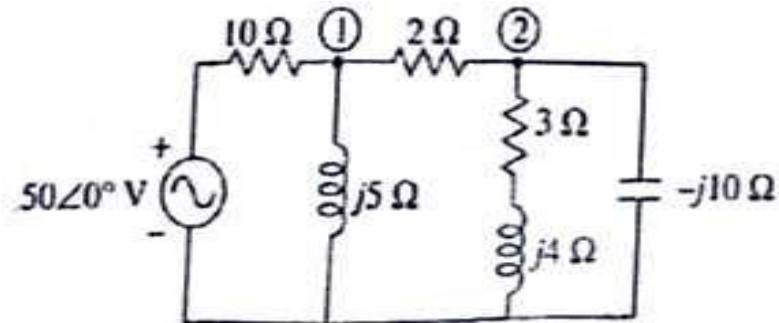
| Branches → |    |    |    |   |   |   |   |
|------------|----|----|----|---|---|---|---|
| 1          | 2  | 3  | 4  | 5 | 6 | 7 | 8 |
| -1         | -1 | 0  | 0  | 0 | 0 | 1 | 0 |
| 0          | 1  | 1  | 0  | 1 | 0 | 0 | 0 |
| 0          | 0  | -1 | -1 | 0 | 1 | 0 | 0 |
| 1          | 0  | 0  | 1  | 0 | 0 | 0 | 1 |

Draw oriented graph and write tieset matrix.

- d) Draw the dual of the network.



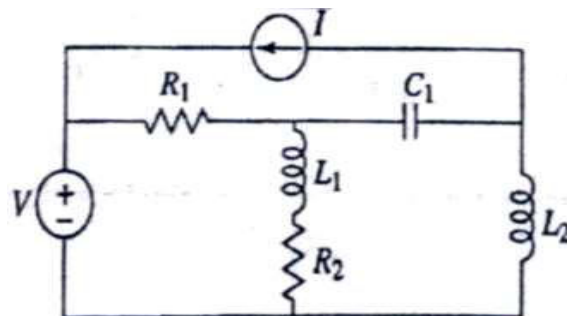
- e) Find  $V_1$  and  $V_2$ .



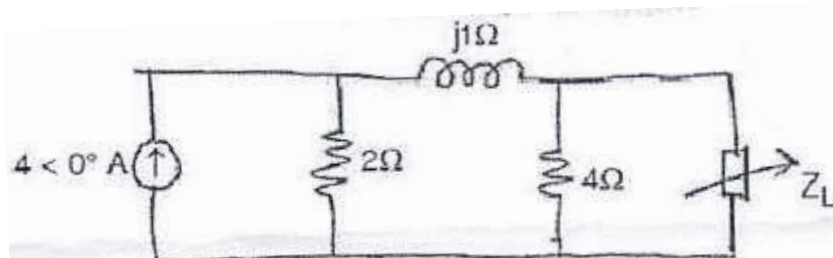
### Q.3 Attempt Any Two.

12

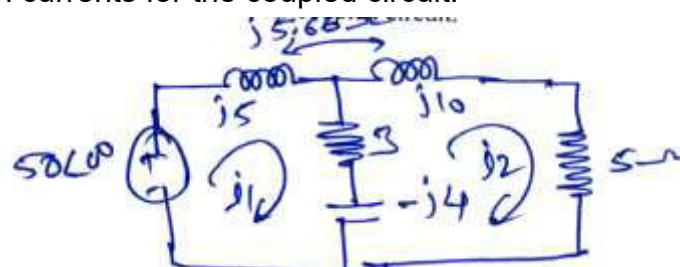
- a) For the given network find incidence matrix, tie set matrix and f-cut set matrix.



- b) Determine the load  $Z_L$  required to be connected in the network for Maximum Power Transfer Theorem. Determine the maximum power drawn:



- c) Find the such currents for the coupled circuit.

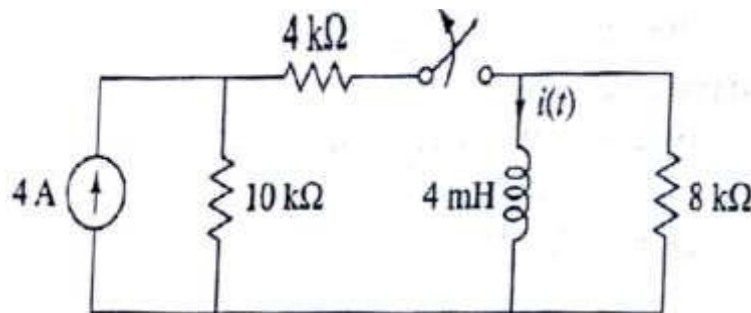


## Section – II

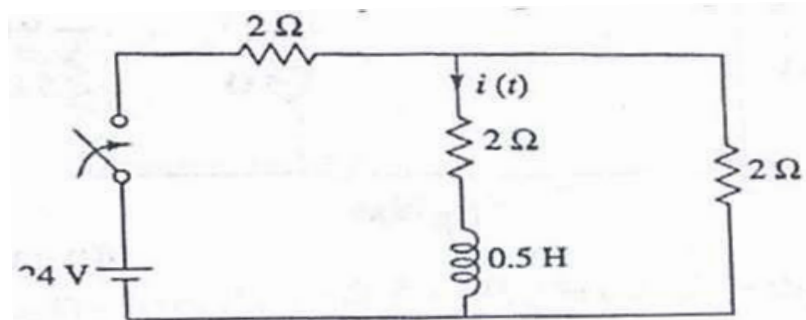
16

**Q.4 Attempt Any Four:**

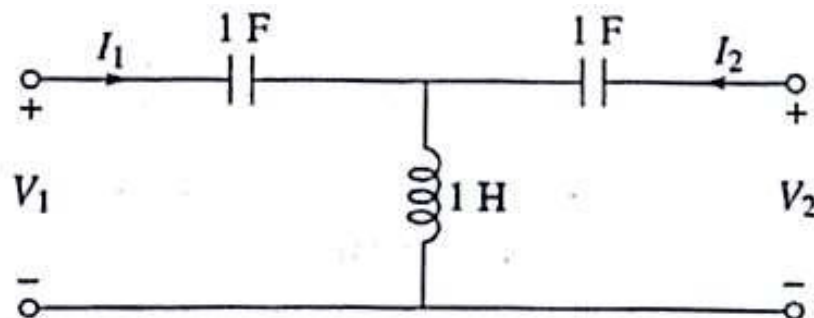
- a) In the network shown in fig is under steady state condition. At  $t=0$  the switch is closed obtain the expression for  $i(t)$ .



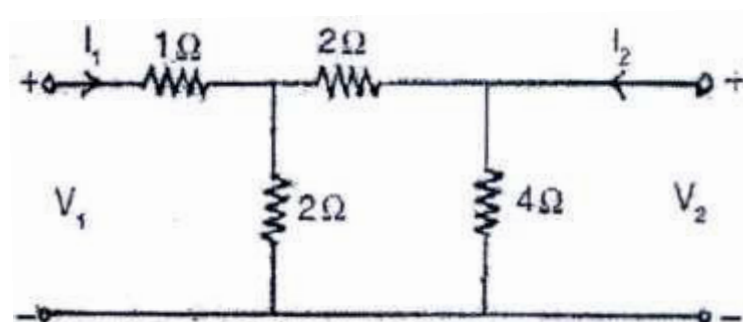
- b) Determine the current  $i(t)$  in the network shown in fig. when the switch is closed at  $t=0$ . The inductor is initially unenergized. Using Laplace transformation method.



- c) Show ABCD parameters for the network shown in fig.



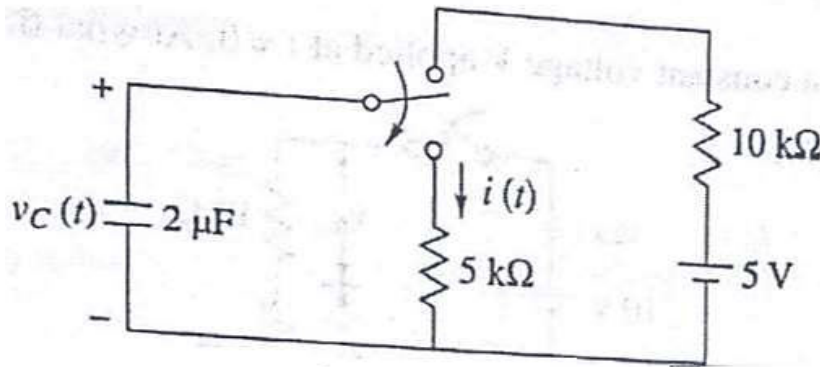
- d) Determine hybrid parameters for the network shown below:



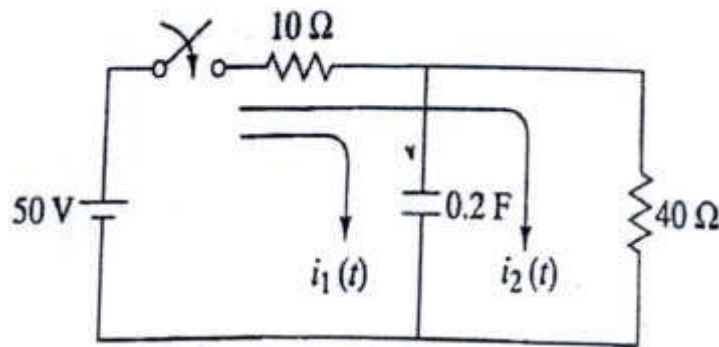
- e) Derive h parameters in terms of z parameter.

**Q.5 Attempt Any Two.**

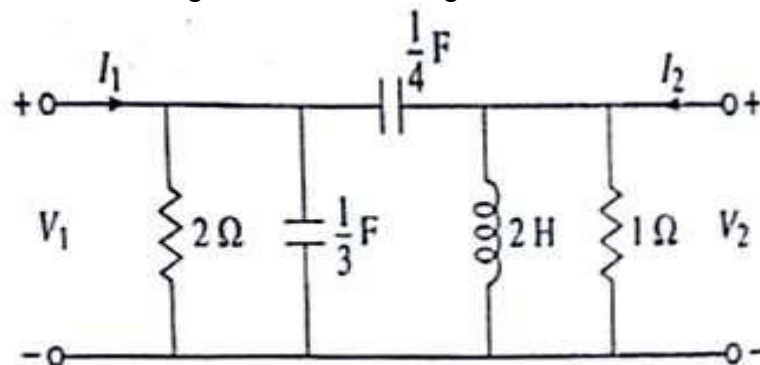
- a) The circuit shown has acquired steady state before switching at  $t = 0$ .
- Obtain  $v_C(0^+)$ ,  $v_C(0^-)$ ,  $i(0^+)$  and  $i(0^-)$ ,
  - Obtain time constant for  $t > 0$ .
  - Find current  $i(t)$  for  $t > 0$



- b) In the network in fig. Find current  $i_1(t)$  and  $i_2(t)$  for  $t > 0$ . Using Laplace transformation method.



- c) Find Y parameters the given network in fig.





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| Seat No. |  |
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Set **R**

**S.Y. (B.Tech.) (Sem - II) (New)(CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Network Analysis (BTN07405)**

Day & Date: Tuesday, 28-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

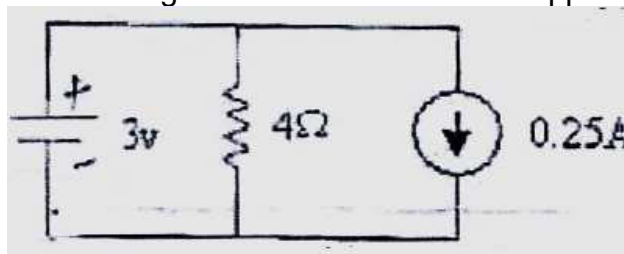
Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct alternatives from the given options.**

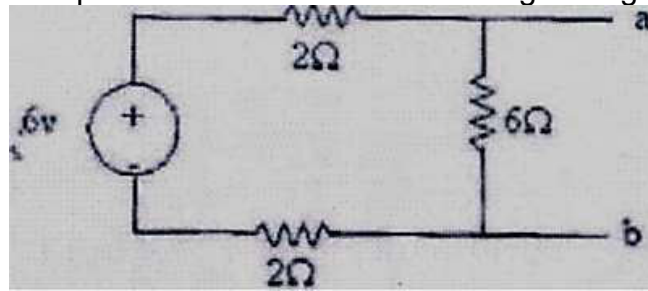
**14**

- 1) The LT of cosine hyperbolic function  $\cosh wt$  is \_\_\_\_\_.  
 a)  $W/(S^2 + W^2)$                       b)  $W/(S^2 - W^2)$   
 c)  $s/(S^2 + W^2)$                       d)  $S/(S^2 - W^2)$
- 2) Condition of reciprocity in Y-parameter representation is \_\_\_\_\_.  
 a)  $Y_{11} = Y_{12}$                       b)  $Y_{12} = Y_{21}$   
 c)  $Y_{11} = Y_{22}$                       d)  $Y_{12} = Y_{22}$
- 3) What does the connectivity of energy source at the port of network known as?  
 a) Driving Point                      b) Transfer Point  
 c) Both a) and b)                      d) none of the above
- 4) The Z-matrix of a two port network is given by  $[0.90.2; 0.20.6]$ . What is the value of  $Y_{22}$ ?  
 a) 1.8                      b) 0.27  
 c) 0.9                      d) 3.6
- 5) For the circuit shown in fig. Determine the current supplied by 3V source.

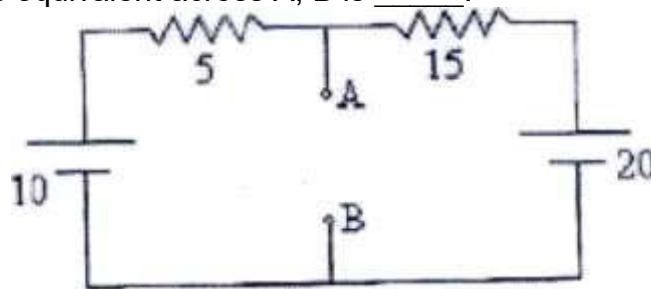


- a) 0.25A                      b) 0.75A
- c) 0.5A                      d) 1.0A

- 6) The Thevenin's equivalent of the circuit shown in given fig. is \_\_\_\_\_.



- a) 6V,  $2.4\Omega$                       b) 3.6V,  $2\Omega$   
 c) 3.6V,  $2.4\Omega$                       d) 2V,  $10\Omega$
- 7) The Norton's equivalent across A, B is \_\_\_\_\_.



- a) 3 A,  $3\Omega$                       b) 2 A,  $2.5\Omega$   
 c) 3.3 A,  $3.75\Omega$                       d) 3.3 A,  $3.0\Omega$
- 8) Superposition theorem is not applicable to network containing \_\_\_\_\_.  
 a) nonlinear elements                      b) dependent voltage source  
 c) dependent current source                      d) Transformers
- 9) The graph of a network has six branches with three tree branches. The minimum number of equations required for the solution of the network is \_\_\_\_\_.  
 a) 3                      b) 4  
 c) 12                      d) 5
- 10) According to the linear graph theory, the number of possible trees is always equal to the determinant of product of \_\_\_\_\_.  
 a) Only complete incidence matrix  
 b) Reduced incidence matrix & its transpose  
 c) Cut-set matrix  
 d) Tie-set matrix
- 11) Two networks are said to be Dual of each other when \_\_\_\_\_.  
 a) Mesh equations of one network are same as the mesh equations of the other.  
 b) Node equations of one network are same as the node equations of the other  
 c) Mesh equations of one network are same as the node equations of the other.  
 d) None of the above
- 12) In RLC series circuit  $R = 2\Omega$ ,  $L = 2\text{mH}$  and  $C = 1\mu\text{F}$ . Find the time constant of the circuit?  
 a)  $1\mu\text{sec}$                       b) 2 msec  
 c)  $2\mu\text{sec}$                       d) 4 msec

- 13)** In RLC circuit, if  $\alpha > \omega$  0 then the current gives \_\_\_\_\_.  
a) Critically damped response      b) Over-damped response  
c) Under-damped response      d) None of the Above
- 14)** The s-domain equivalent of the capacitor reduces to a capacitor with impedance?  
a)  $sC$       b)  $C$   
c)  $1/C$       d)  $1/sC$

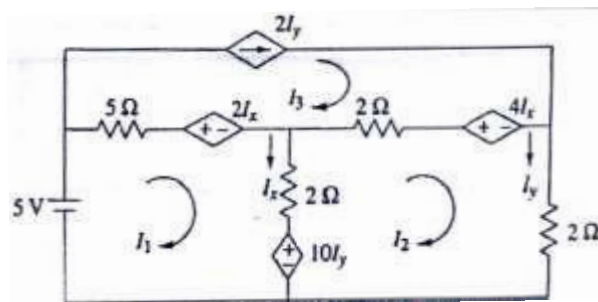
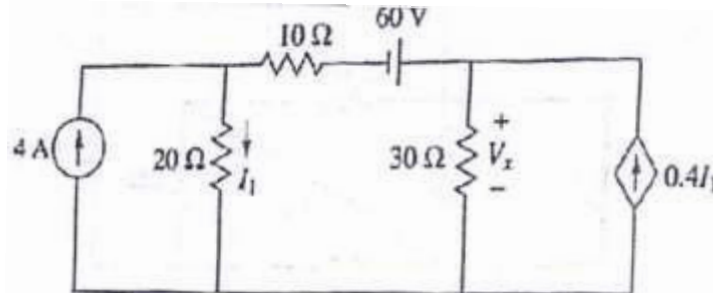
Seat  
No.

**S.Y. (B.Tech.) (Sem - II) (New)(CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Network Analysis (BTN07405)**

Day & Date: Tuesday, 28-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

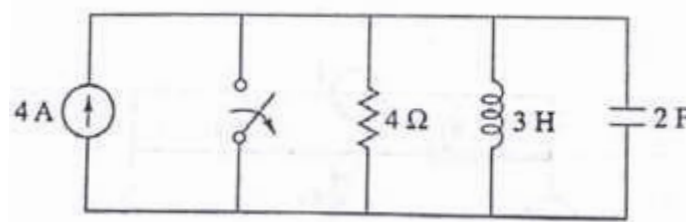
**Section –I****Q.2 Attempt any Four.****16**a) Find  $I_x$  and  $I_y$  by using mesh analysis method.b) Find the voltage  $V_x$  by using superposition Theorem.

c) The incidence matrix is given as follows:

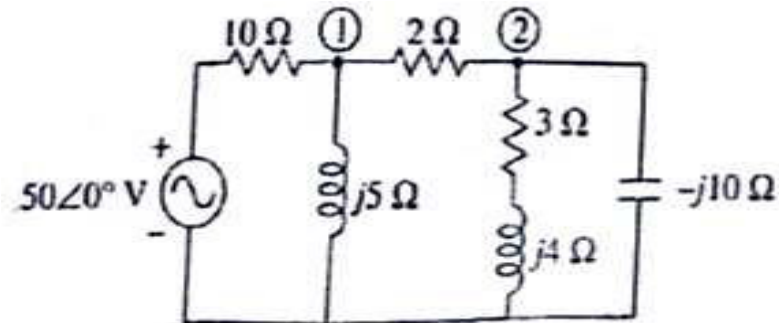
| Branches → |    |    |    |   |   |   |   |
|------------|----|----|----|---|---|---|---|
| 1          | 2  | 3  | 4  | 5 | 6 | 7 | 8 |
| -1         | -1 | 0  | 0  | 0 | 0 | 1 | 0 |
| 0          | 1  | 1  | 0  | 1 | 0 | 0 | 0 |
| 0          | 0  | -1 | -1 | 0 | 1 | 0 | 0 |
| 1          | 0  | 0  | 1  | 0 | 0 | 0 | 1 |

Draw oriented graph and write tieset matrix.

- d) Draw the dual of the network.



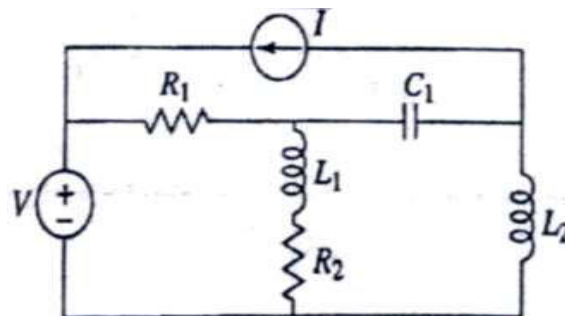
- e) Find  $V_1$  and  $V_2$ .



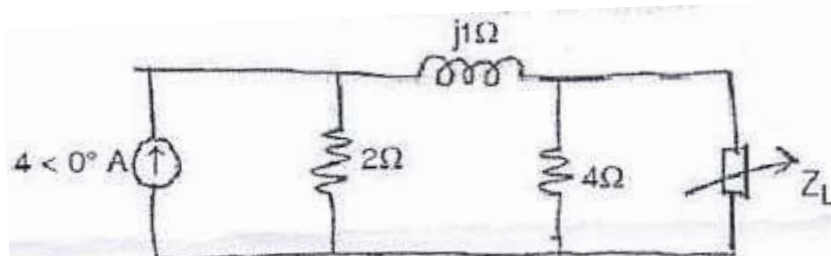
### Q.3 Attempt Any Two.

12

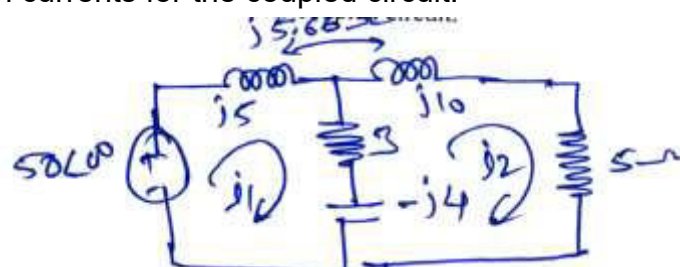
- a) For the given network find incidence matrix, tie set matrix and f-cut set matrix.



- b) Determine the load  $Z_L$  required to be connected in the network for Maximum Power Transfer Theorem. Determine the maximum power drawn:



- c) Find the such currents for the coupled circuit.

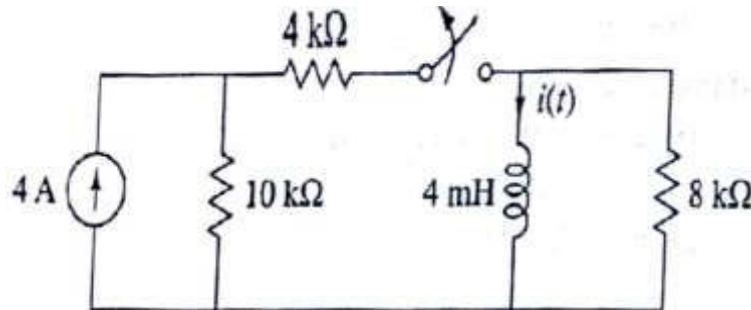


## Section – II

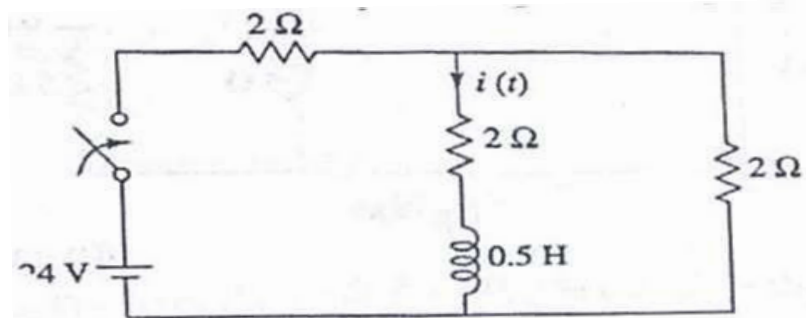
16

## Q.4 Attempt Any Four:

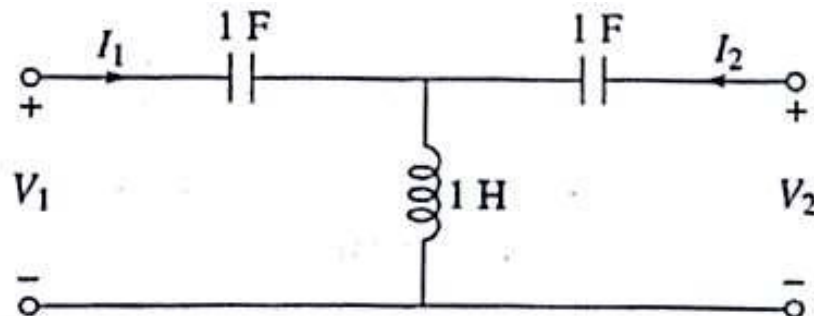
- a) In the network shown in fig is under steady state condition. At  $t=0$  the switch is closed obtain the expression for  $i(t)$ .



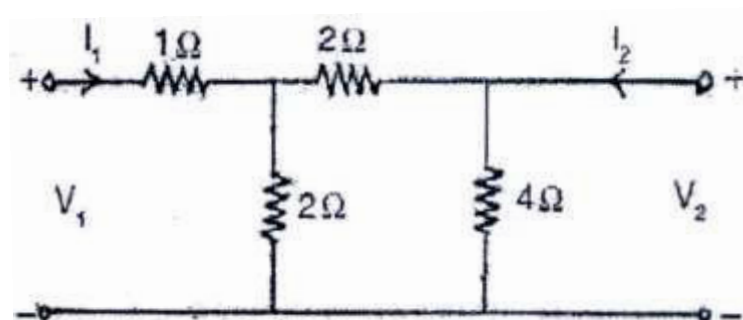
- b) Determine the current  $i(t)$  in the network shown in fig. when the switch is closed at  $t=0$ . The inductor is initially unenergized. Using Laplace transformation method.



- c) Show ABCD parameters for the network shown in fig.



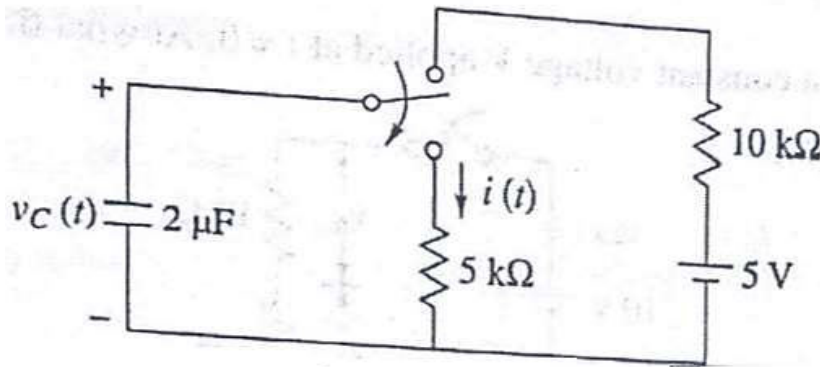
- d) Determine hybrid parameters for the network shown below:



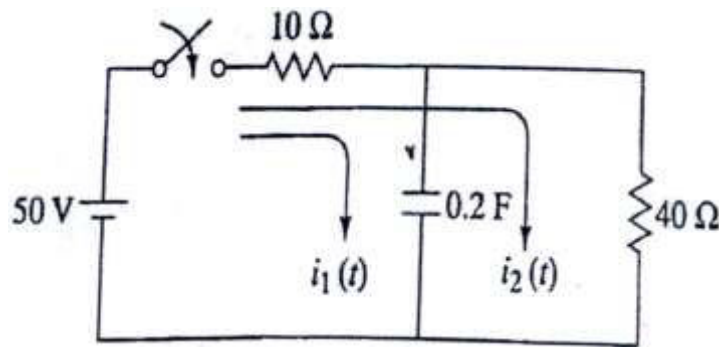
- e) Derive h parameters in terms of z parameter.

**Q.5 Attempt Any Two.**

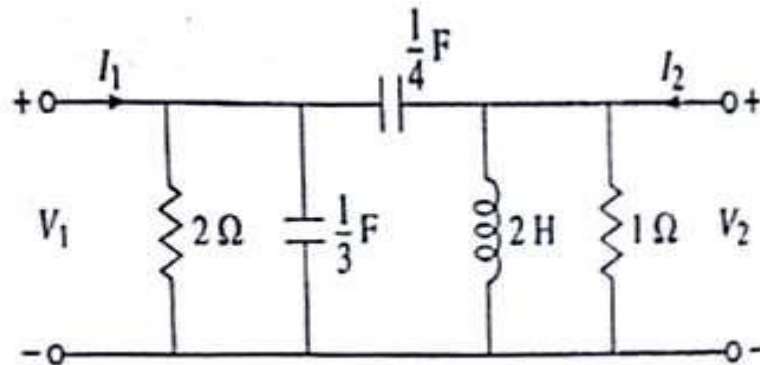
- a) The circuit shown has acquired steady state before switching at  $t = 0$ .
- Obtain  $v_C(0^+)$ ,  $v_C(0^-)$ ,  $i(0^+)$  and  $i(0^-)$ ,
  - Obtain time constant for  $t > 0$ .
  - Find current  $i(t)$  for  $t > 0$



- b) In the network in fig. Find current  $i_1(t)$  and  $i_2(t)$  for  $t > 0$ . Using Laplace transformation method.



- c) Find Y parameters the given network in fig.



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Set **S**

**S.Y. (B.Tech.) (Sem - II) (New)(CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Network Analysis (BTN07405)**

Day & Date: Tuesday, 28-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

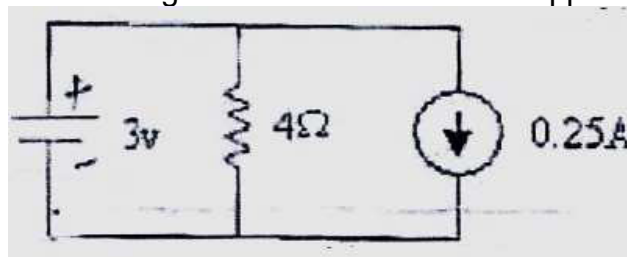
**Q.1 Choose the correct alternatives from the given options.**

**14**

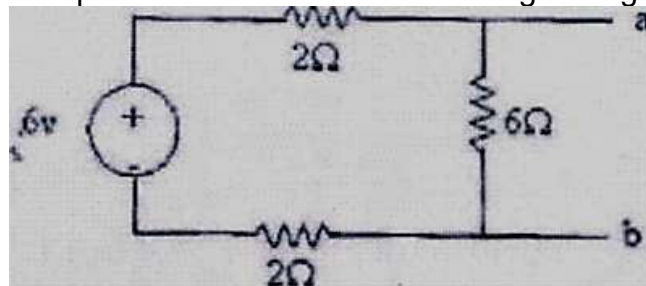
- 1) According to the linear graph theory, the number of possible trees is always equal to the determinant of product of \_\_\_\_\_.  
 a) Only complete incidence matrix  
 b) Reduced incidence matrix & its transpose  
 c) Cut-set matrix  
 d) Tie-set matrix
- 2) Two networks are said to be Dual of each other when \_\_\_\_\_.  
 a) Mesh equations of one network are same as the mesh equations of the other.  
 b) Node equations of one network are same as the node equations of the other  
 c) Mesh equations of one network are same as the node equations of the other.  
 d) None of the above
- 3) In RLC series circuit  $R = 2\Omega$ ,  $L = 2\text{mH}$  and  $C = 1\mu\text{F}$ . Find the time constant of the circuit?  
 a)  $1\mu\text{sec}$   
 b)  $2\text{msec}$   
 c)  $2\mu\text{sec}$   
 d)  $4\text{msec}$
- 4) In RLC circuit, if  $\alpha > \omega$  then the current gives \_\_\_\_\_.  
 a) Critically damped response  
 b) Over-damped response  
 c) Under-damped response  
 d) None of the Above
- 5) The s-domain equivalent of the capacitor reduces to a capacitor with impedance?  
 a)  $sC$   
 b)  $C$   
 c)  $1/C$   
 d)  $1/sC$
- 6) The LT of cosine hyperbolic function  $\cosh wt$  is \_\_\_\_\_.  
 a)  $W/(S^2 + W^2)$   
 b)  $W/(S^2 - W^2)$   
 c)  $s/(S^2 + W^2)$   
 d)  $S/(S^2 - W^2)$



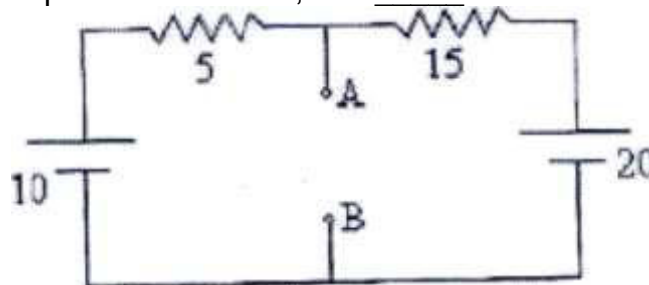
- 7) Condition of reciprocity in Y-parameter representation is \_\_\_\_\_.  
 a)  $Y_{11} = Y_{12}$  b)  $Y_{12} = Y_{21}$   
 c)  $Y_{11} = Y_{22}$  d)  $Y_{12} = Y_{22}$
- 8) What does the connectivity of energy source at the port of network known as?  
 a) Driving Point b) Transfer Point  
 c) Both a) and b) d) none of the above
- 9) The Z-matrix of a two port network is given by  $[0.90.2; 0.20.6]$ . What is the value of  $Y_{22}$ ?  
 a) 1.8 b) 0.27  
 c) 0.9 d) 3.6
- 10) For the circuit shown in fig. Determine the current supplied by 3V source.



- a) 0.25A b) 0.75A  
 c) 0.5A d) 1.0A
- 11) The Thevenin's equivalent of the circuit shown in given fig. is \_\_\_\_\_.



- a) 6V, 2.4Ω b) 3.6V, 2Ω  
 c) 3.6V, 2.4Ω d) 2V, 10Ω
- 12) The Norton's equivalent across A, B is \_\_\_\_\_.



- a) 3 A, 3 Ω b) 2 A, 2.5 Ω  
 c) 3.3 A, 3.75 Ω d) 3.3 A, 3.0 Ω
- 13) Superposition theorem is not applicable to network containing \_\_\_\_\_.  
 a) nonlinear elements b) dependent voltage source  
 c) dependent current source d) Transformers

- 14)** The graph of a network has six branches with three tree branches. The minimum number of equations required for the solution of the network is \_\_\_\_\_.
- |       |      |
|-------|------|
| a) 3  | b) 4 |
| c) 12 | d) 5 |

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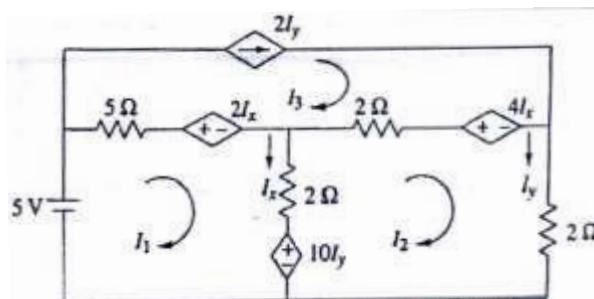
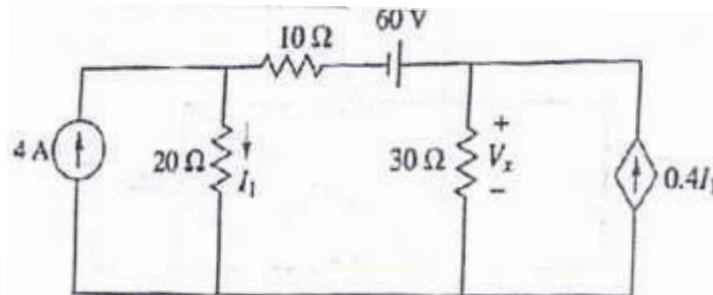
Set **S**

**S.Y. (B.Tech.) (Sem - II) (New)(CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Network Analysis (BTN07405)**

Day & Date: Tuesday, 28-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

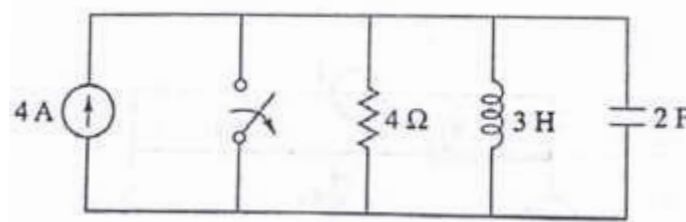
**Section –I****Q.2 Attempt any Four.****16**a) Find  $I_x$  and  $I_y$  by using mesh analysis method.b) Find the voltage  $V_x$  by using superposition Theorem.

c) The incidence matrix is given as follows:

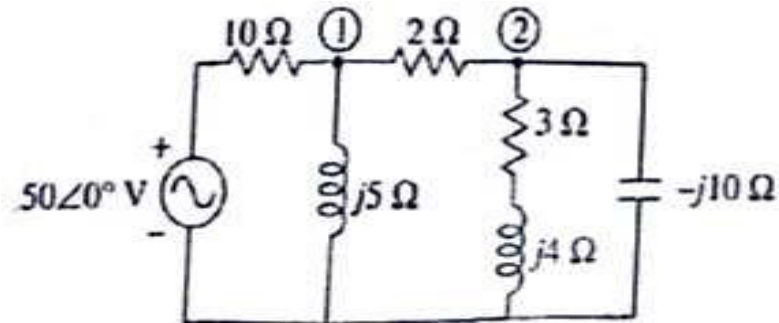
| Branches → |    |    |    |   |   |   |   |
|------------|----|----|----|---|---|---|---|
| 1          | 2  | 3  | 4  | 5 | 6 | 7 | 8 |
| -1         | -1 | 0  | 0  | 0 | 0 | 1 | 0 |
| 0          | 1  | 1  | 0  | 1 | 0 | 0 | 0 |
| 0          | 0  | -1 | -1 | 0 | 1 | 0 | 0 |
| 1          | 0  | 0  | 1  | 0 | 0 | 0 | 1 |

Draw oriented graph and write tieset matrix.

- d) Draw the dual of the network.



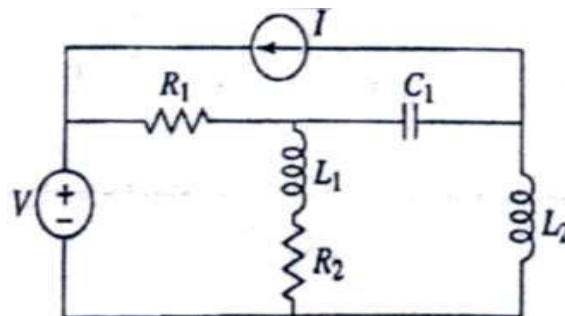
- e) Find  $V_1$  and  $V_2$ .



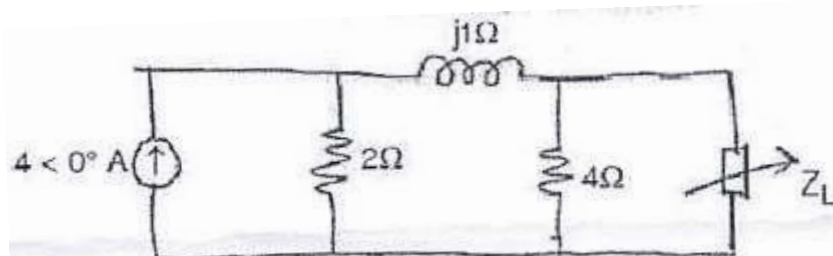
### Q.3 Attempt Any Two.

12

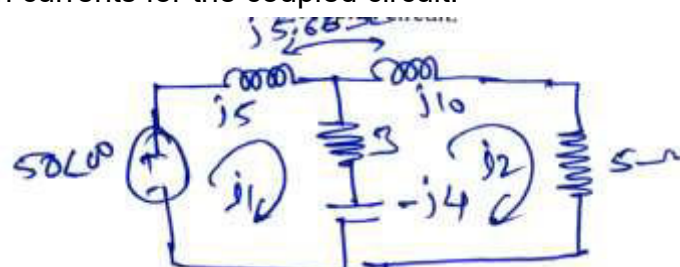
- a) For the given network find incidence matrix, tie set matrix and f-cut set matrix.



- b) Determine the load  $Z_L$  required to be connected in the network for Maximum Power Transfer Theorem. Determine the maximum power drawn:



- c) Find the such currents for the coupled circuit.

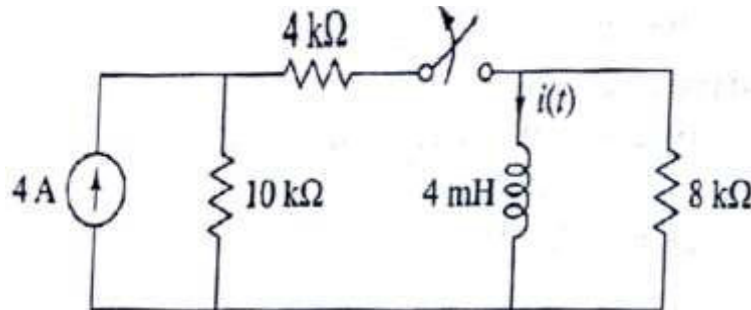


## Section – II

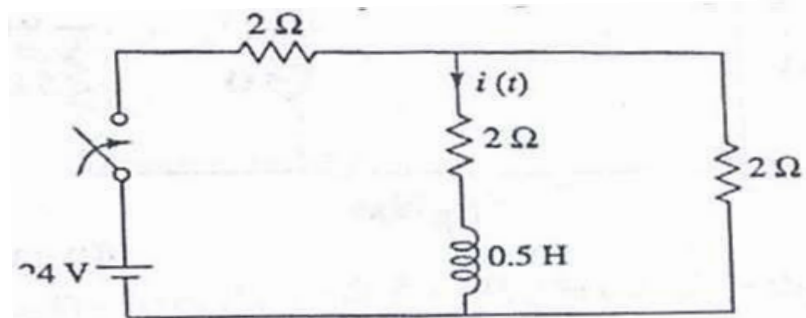
16

## Q.4 Attempt Any Four:

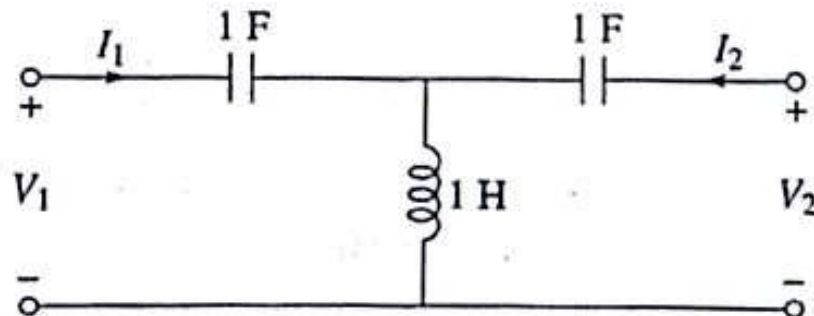
- a) In the network shown in fig is under steady state condition. At  $t=0$  the switch is closed obtain the expression for  $i(t)$ .



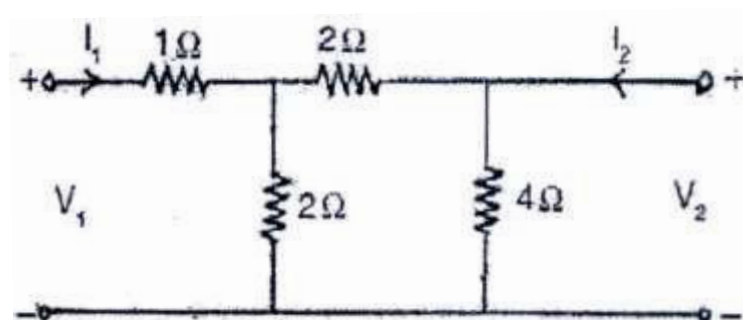
- b) Determine the current  $i(t)$  in the network shown in fig. when the switch is closed at  $t=0$ . The inductor is initially unenergized. Using Laplace transformation method.



- c) Show ABCD parameters for the network shown in fig.



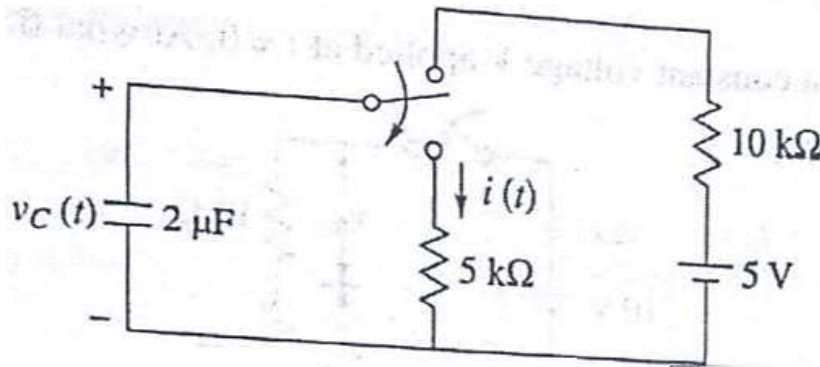
- d) Determine hybrid parameters for the network shown below:



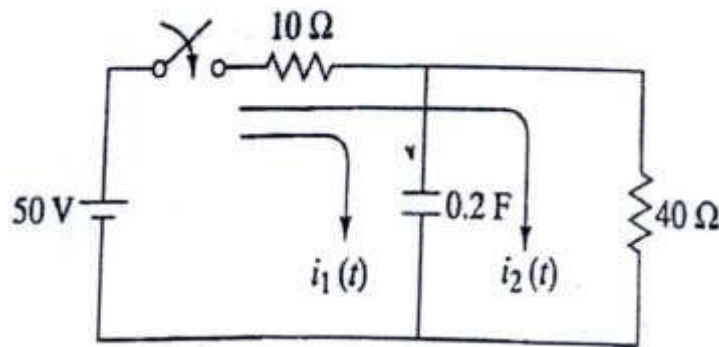
- e) Derive h parameters in terms of z parameter.

**Q.5 Attempt Any Two.**

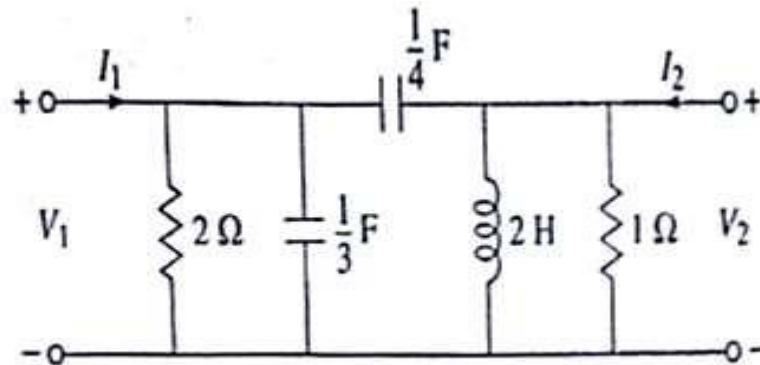
- a) The circuit shown has acquired steady state before switching at  $t = 0$ .
- Obtain  $v_C(0^+)$ ,  $v_C(0^-)$ ,  $i(0^+)$  and  $i(0^-)$ ,
  - Obtain time constant for  $t > 0$ .
  - Find current  $i(t)$  for  $t > 0$



- b) In the network in fig. Find current  $i_1(t)$  and  $i_2(t)$  for  $t > 0$ . Using Laplace transformation method.



- c) Find Y parameters the given network in fig.



|                 |  |
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| <b>Seat No.</b> |  |
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Day & Date: Thursday, 30-05-2024  
Time: 10:00 AM To 01:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.
- 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.
- 3) Figures to the right indicates full marks.
- 4) Use of non-programmable calculator is allowed.

## Marks:14

## 14

- 1) An equation represented as  $3x - \cos x - 1 = 0$  is \_\_\_\_\_.  
a) Algebraic                                      b) Transcendental  
c) Both of these                                  d) None of these
- 2) The order of convergence of Newton-Raphson method is \_\_\_\_\_.  
a) 0                                                b) 2  
c) 3                                                d) 4
- 3) As soon as a new value for a variable is found by iteration, it is used immediately in the following equation. This method is called \_\_\_\_\_.  
a) Gauss Seidel                                  b) Gauss Elimination  
c) Gauss Jacobi                                  d) None of these
- 4) Identify the method of solving simultaneous linear equation in which coefficient matrix is expressed as the product of lower and upper triangular matrix.  
a) Gauss-Jacobi's                                  b) Gauss-Elimination  
c) LU-Factorization                              d) Gauss-Seidal
- 5) The error in the trapezoidal rule is of the order \_\_\_\_\_.  
a)  $h$                                                 b)  $h^2$   
c)  $h^3$                                                 d)  $h^4$
- 6) Romberg's method is also known as \_\_\_\_\_.  
a) Trapezoidal rule                              b) Simpson's 1/3rd Rule  
c) Simpson's 3/8th Rule                        d) Romberg's Integration
- 7) Gaussian Quadrature for  $n = 2$ ?  
a)  $f\left(-\frac{1}{\sqrt{3}}\right) + f\left(-\frac{2}{\sqrt{3}}\right)$                         b)  $f\left(\frac{1}{\sqrt{3}}\right) + f\left(-\frac{1}{\sqrt{3}}\right)$   
c)  $f\left(-\frac{1}{\sqrt{2}}\right) + f\left(-\frac{1}{\sqrt{2}}\right)$                         d) None of these

- 8) Let  $A$  be given matrix. The columns of  $A$  are linearly independent if and only if the equation  $AX = 0$
- a) non trivial solution                      b) no solution  
c) only trivial solution                      d) none of these
- 9) The dimension of Col  $A$  are \_\_\_\_\_.  
a) The number of columns in  $A$   
b) The number of pivot columns in  $A$   
c) The number of rows in  $A$   
d) None of these
- 10) The Eigen values of the matrix are  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$
- a) 1,2,3                                              b) 0,1,2  
c) 0,2,3                                              d) 0,0,3
- 11) If inner product of two vectors  $u, v$  are orthogonal if and only if \_\_\_\_\_.  
a)  $u \cdot v = 1$                                       b)  $u \cdot v = 2$   
c)  $u \cdot v = 0$                                       d) None of these
- 12) Least square error in least square solution is \_\_\_\_\_.  
a)  $\|b - Ax\|$                                       b)  $\|bAX\|$   
c)  $\|b + AX\|$                                       d)  $\|-Ab - AX\|$
- 13) A Set of vectors are linearly independent if \_\_\_\_\_.  
a) one vector is not multiple of each other  
b) one vector is multiple of each other  
c) Zero vector  
d) none of these
- 14) Let  $A$  be  $n \times n$  symmetric matrix then quadratic form  $X'AX$  is positive definite If and only if \_\_\_\_\_.  
a) all Eigen values are negative              b) all Eigen values are nonzero  
c) all Eigen values are zero                      d) all Eigen values are positive



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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Numerical Methods and Linear Algebra (BTN07401)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Solve any Three of the following.**

**09**

- Using Newton Raphson method to find a root of the equation  
 $x^4 - x - 10 = 0$
- Derive Newton iterative formula for  $f(x) = \sqrt{N}$ .
- Find the double root of  $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$ , given that it is approaches to 1.5.
- Solve the system of equation by Gauss Elimination method  
 $2x + 3y - z = 5, 4x + 4y - 3z = 3, 2x - 3y + 2z = 2$
- Solve the system of equation by Gauss-Jacobi's method (Three Iterations)  
 $10x - 5y - 2z = 3, 4x - 10y + 3z = -3, x + 6y + 10z = -3$

**Q.3 Solve any Three of the following.**

**09**

- Apply Runge- Kutta method of Fourth order to solve differential Equation given that  
 $\frac{dy}{dx} = x + y$ , given  $y = 1$ , when  $x = 0$  taking  $h = 0.1$
- Evaluate  $\int_0^1 \frac{1}{1+x^2} dx$  using  $n = 6$  by Trapezoidal rule.
- Find  $\int_0^4 e^x dx$  taking step length 1 by Simpson's  $1/3^{rd}$  rule.
- Evaluate  $\int_{-1}^1 \frac{1}{1+x^2} dx$  Using Gauss formula for  $n = 2, n = 3$ .
- Evaluate  $\int_0^1 \frac{1}{1+x} dx$  by Romberg's Integration.

**Q.4 Solve any Two of the following.**

**10**

- Solve the nonlinear equations by Newton Method up to two iteration  
 $x^2 + y = 11, x + y^2 = 7$  with initial approximations  $x_0 = 3.5, y_0 = -1.8$
- By the method of Factorization solve the following system of equations.  
 $x + y + z = 1, 4x + 3y - z = 6, 3x + 5y + 3z = 4$
- Apply Runge-Kutta Method to find the second approximation to the values of  $y$  and  $z$  given that  $\frac{dy}{dx} = x + z, \frac{dz}{dx} = x - y^2$  given  $y = 2, z = 1$  when  $x = 0$   
 Hence find  $y(0.1)$  and  $z(0.1)$

## Section – II

**Q.5 Solve any Three of the following.****09**

- a) Determine the following system of Equations having non trivial solution then describe the solution set  
 $3x_1 + 5x_2 - 4x_3 = 0, -3x_1 - 2x_2 + 4x_3 = 0, 6x_1 + x_2 - 8x_3 = 0$
- b) Define a linear Transformation  $T: R^2 \rightarrow R^2$  by  
 $T(x) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -x_2 \\ x_1 \end{bmatrix}$  Find the images under  $T$  of  $u = \begin{bmatrix} 4 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$
- c) Let  $V_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, V_2 = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}, V_3 = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$  Check the vectors are linearly independent or dependent.
- d) Let  $A = \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix}$  and  $u = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$  determine  $u$  belongs to Null of  $A$ .
- e) Find the dimension of the subspace  $H = \left\{ \begin{pmatrix} a - 3b + 6c \\ 5a + 4d \\ b - 2c - d \\ 5d \end{pmatrix} : a, b, c, d \text{ in } R \right\}$

**Q.6 Solve any Three of the following.****09**

- a) Determine the rank of Matrix  $A = \begin{bmatrix} 2 & 5 & -3 & -4 & 8 \\ 4 & 7 & -4 & -3 & 9 \\ 6 & 9 & -5 & 2 & 4 \\ 0 & -9 & 6 & 5 & -6 \end{bmatrix} =$
- b) Find the Eigen values of  $A = \begin{bmatrix} 2 & 3 \\ 3 & -6 \end{bmatrix}$
- c) Let  $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$  find the formula for  $A^k$  given that  $A = PDP^{-1}$  where  
 $P = \begin{bmatrix} 1 & 1 \\ -1 & -2 \end{bmatrix}$  and  $D = \begin{bmatrix} 5 & 0 \\ 0 & 3 \end{bmatrix}$
- d) Show that  $\{u_1, u_2, u_3\}$  is an orthogonal vectors where Let  
 $u_1 = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix}, u_2 = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}, u_3 = \begin{bmatrix} -1/2 \\ -2 \\ 7/2 \end{bmatrix}$
- e) Show that the quadratic form  $3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 + 2x_1x_3 - 2x_2x_3$  is positive definite.

**Q.7 Solve any Two of the following.**

- a) Let  $b_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ ,  $b_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$  and  $X = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$  and  $\beta = \{b_1, b_2\}$  find the Coordinator Vector  $[X]_\beta$  of  $X$  relative to  $\beta$
- b) Apply Power Method to  $A = \begin{bmatrix} 6 & 5 \\ 1 & 2 \end{bmatrix}$  with  $X_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$  Stop when  $k = 5$ .
- c) Find Least Square solutions of the inconsistent system  $Ax = b$  for  
 $A = \begin{bmatrix} 4 & 0 \\ 0 & 2 \\ 1 & 1 \end{bmatrix}$  and  $b = \begin{bmatrix} 2 \\ 0 \\ 11 \end{bmatrix}$

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Set **Q**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Numerical Methods and Linear Algebra (BTN07401)**

Day &amp; Date: Thursday, 30-05-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Use of non-programmable calculator is allowed.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Select Correct alternatives.****14**

- 1) Let A be given matrix. The columns of A are linearly independent if and only if the equation  $AX = 0$ 
  - a) non trivial solution
  - b) no solution
  - c) only trivial solution
  - d) none of these
- 2) The dimension of Col A are \_\_\_\_\_.
  - a) The number of columns in A
  - b) The number of pivot columns in A
  - c) The number of rows in A
  - d) None of these
- 3) The Eigen values of the matrix are  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$ 
  - a) 1,2,3
  - b) 0,1,2
  - c) 0,2,3
  - d) 0,0,3
- 4) If inner product of two vectors  $u, v$  are orthogonal if and only if \_\_\_\_\_.
  - a)  $u \cdot v = 1$
  - b)  $u \cdot v = 2$
  - c)  $u \cdot v = 0$
  - d) None of these
- 5) Least square error in least square solution is \_\_\_\_\_.
  - a)  $\|b - Ax\|$
  - b)  $\|bAX\|$
  - c)  $\|b + AX\|$
  - d)  $\|-Ab - AX\|$
- 6) A Set of vectors are linearly independent if \_\_\_\_\_.
  - a) one vector is not multiple of each other
  - b) one vector is multiple of each other
  - c) Zero vector
  - d) none of these
- 7) Let A be  $n \times n$  symmetric matrix then quadratic form  $X'AX$  is positive definite If and only if \_\_\_\_\_.
  - a) all Eigen values are negative
  - b) all Eigen values are nonzero
  - c) all Eigen values are zero
  - d) all Eigen values are positive

- 8) An equation represented as  $3x - \cos x - 1 = 0$  is \_\_\_\_\_.
  - a) Algebraic
  - b) Transcendental
  - c) Both of these
  - d) None of these
- 9) The order of convergence of Newton-Raphson method is \_\_\_\_\_.
  - a) 0
  - b) 2
  - c) 3
  - d) 4
- 10) As soon as a new value for a variable is found by iteration, it is used immediately in the following equation. This method is called \_\_\_\_\_.
  - a) Gauss Seidel
  - b) Gauss Elimination
  - c) Gauss Jacobi
  - d) None of these
- 11) Identify the method of solving simultaneous linear equation in which coefficient matrix is expressed as the product of lower and upper triangular matrix.
  - a) Gauss-Jacobi's
  - b) Gauss-Elimination
  - c) LU-Factorization
  - d) Gauss-Seidal
- 12) The error in the trapezoidal rule is of the order \_\_\_\_\_.
  - a)  $h$
  - b)  $h^2$
  - c)  $h^3$
  - d)  $h^4$
- 13) Romberg's method is also known as \_\_\_\_\_.
  - a) Trapezoidal rule
  - b) Simpson's 1/3rd Rule
  - c) Simpson's 3/8th Rule
  - d) Romberg's Integration
- 14) Gaussian Quadrature for  $n = 2$ ?
  - a)  $f\left(-\frac{1}{\sqrt{3}}\right) + f\left(-\frac{2}{\sqrt{3}}\right)$
  - b)  $f\left(\frac{1}{\sqrt{3}}\right) + f\left(-\frac{1}{\sqrt{3}}\right)$
  - c)  $f\left(-\frac{1}{\sqrt{2}}\right) + f\left(-\frac{1}{\sqrt{2}}\right)$
  - d) None of these

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Set **Q**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Numerical Methods and Linear Algebra (BTN07401)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I****Q.2 Solve any Three of the following.****09**

- Using Newton Raphson method to find a root of the equation  
 $x^4 - x - 10 = 0$
- Derive Newton iterative formula for  $f(x) = \sqrt{N}$ .
- Find the double root of  $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$ , given that it is approaches to 1.5.
- Solve the system of equation by Gauss Elimination method  
 $2x + 3y - z = 5, 4x + 4y - 3z = 3, 2x - 3y + 2z = 2$
- Solve the system of equation by Gauss-Jacobi's method (Three Iterations)  
 $10x - 5y - 2z = 3, 4x - 10y + 3z = -3, x + 6y + 10z = -3$

**Q.3 Solve any Three of the following.****09**

- Apply Runge- Kutta method of Fourth order to solve differential Equation given that  
 $\frac{dy}{dx} = x + y$ , given  $y = 1$ , when  $x = 0$  taking  $h = 0.1$
- Evaluate  $\int_0^1 \frac{1}{1+x^2} dx$  using  $n = 6$  by Trapezoidal rule.
- Find  $\int_0^4 e^x dx$  taking step length 1 by Simpson's  $1/3^{rd}$  rule.
- Evaluate  $\int_{-1}^1 \frac{1}{1+x^2} dx$  Using Gauss formula for  $n = 2, n = 3$ .
- Evaluate  $\int_0^1 \frac{1}{1+x} dx$  by Romberg's Integration.

**Q.4 Solve any Two of the following.****10**

- Solve the nonlinear equations by Newton Method up to two iteration  
 $x^2 + y = 11, x + y^2 = 7$  with initial approximations  $x_0 = 3.5, y_0 = -1.8$
- By the method of Factorization solve the following system of equations.  
 $x + y + z = 1, 4x + 3y - z = 6, 3x + 5y + 3z = 4$
- Apply Runge-Kutta Method to find the second approximation to the values of  $y$  and  $z$  given that  $\frac{dy}{dx} = x + z, \frac{dz}{dx} = x - y^2$  given  $y = 2, z = 1$  when  $x = 0$   
 Hence find  $y(0.1)$  and  $z(0.1)$

## Section – II

**Q.5 Solve any Three of the following.****09**

- a) Determine the following system of Equations having non trivial solution then describe the solution set  
 $3x_1 + 5x_2 - 4x_3 = 0, -3x_1 - 2x_2 + 4x_3 = 0, 6x_1 + x_2 - 8x_3 = 0$
- b) Define a linear Transformation  $T: R^2 \rightarrow R^2$  by  
 $T(x) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -x_2 \\ x_1 \end{bmatrix}$  Find the images under  $T$  of  $u = \begin{bmatrix} 4 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$
- c) Let  $V_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, V_2 = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}, V_3 = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$  Check the vectors are linearly independent or dependent.
- d) Let  $A = \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix}$  and  $u = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$  determine  $u$  belongs to Null of  $A$ .
- e) Find the dimension of the subspace  $H = \left\{ \begin{pmatrix} a - 3b + 6c \\ 5a + 4d \\ b - 2c - d \\ 5d \end{pmatrix} : a, b, c, d \text{ in } R \right\}$

**Q.6 Solve any Three of the following.****09**

- a) Determine the rank of Matrix  $A = \begin{bmatrix} 2 & 5 & -3 & -4 & 8 \\ 4 & 7 & -4 & -3 & 9 \\ 6 & 9 & -5 & 2 & 4 \\ 0 & -9 & 6 & 5 & -6 \end{bmatrix} =$
- b) Find the Eigen values of  $A = \begin{bmatrix} 2 & 3 \\ 3 & -6 \end{bmatrix}$
- c) Let  $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$  find the formula for  $A^k$  given that  $A = PDP^{-1}$  where  
 $P = \begin{bmatrix} 1 & 1 \\ -1 & -2 \end{bmatrix}$  and  $D = \begin{bmatrix} 5 & 0 \\ 0 & 3 \end{bmatrix}$
- d) Show that  $\{u_1, u_2, u_3\}$  is an orthogonal vectors where Let  
 $u_1 = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix}, u_2 = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}, u_3 = \begin{bmatrix} -1/2 \\ -2 \\ 7/2 \end{bmatrix}$
- e) Show that the quadratic form  $3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 + 2x_1x_3 - 2x_2x_3$  is positive definite.

**Q.7 Solve any Two of the following.**

- a) Let  $b_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ ,  $b_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$  and  $X = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$  and  $\beta = \{b_1, b_2\}$  find the Coordinator Vector  $[X]_\beta$  of  $X$  relative to  $\beta$
- b) Apply Power Method to  $A = \begin{bmatrix} 6 & 5 \\ 1 & 2 \end{bmatrix}$  with  $X_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$  Stop when  $k = 5$ .
- c) Find Least Square solutions of the inconsistent system  $Ax = b$  for  
 $A = \begin{bmatrix} 4 & 0 \\ 0 & 2 \\ 1 & 1 \end{bmatrix}$  and  $b = \begin{bmatrix} 2 \\ 0 \\ 11 \end{bmatrix}$



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Day & Date: Thursday, 30-05-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 70

### MCQ/Objective Type Questions

Duration: 30 Minutes

Marks:14

**Q.1 Select Correct alternatives.**

14

- 1) If inner product of two vectors  $u, v$  are orthogonal if and only if \_\_\_\_\_.  
a)  $u \cdot v = 1$                                       b)  $u \cdot v = 2$   
c)  $u \cdot v = 0$                                       d) None of these
- 2) Least square error in least square solution is \_\_\_\_\_.  
a)  $\|b - Ax\|$                                       b)  $\|bAX\|$   
c)  $\|b + AX\|$                                       d)  $\|-Ab - AX\|$
- 3) A Set of vectors are linearly independent if \_\_\_\_\_.  
a) one vector is not multiple of each other  
b) one vector is multiple of each other  
c) Zero vector  
d) none of these
- 4) Let  $A$  be  $n \times n$  symmetric matrix then quadratic form  $X'AX$  is positive definite If and only if \_\_\_\_\_.  
a) all Eigen values are negative              b) all Eigen values are nonzero  
c) all Eigen values are zero                  d) all Eigen values are positive
- 5) An equation represented as  $3x - \cos x - 1 = 0$  is \_\_\_\_\_.  
a) Algebraic                                      b) Transcendental  
c) Both of these                                d) None of these
- 6) The order of convergence of Newton-Raphson method is \_\_\_\_\_.  
a) 0                                                  b) 2  
c) 3                                                  d) 4
- 7) As soon as a new value for a variable is found by iteration, it is used immediately in the following equation. This method is called \_\_\_\_\_.  
a) Gauss Seidel                                  b) Gauss Elimination  
c) Gauss Jacobi                                 d) None of these

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Set **R**

**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Numerical Methods and Linear Algebra (BTN07401)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I****Q.2 Solve any Three of the following.****09**

- Using Newton Raphson method to find a root of the equation  
 $x^4 - x - 10 = 0$
- Derive Newton iterative formula for  $f(x) = \sqrt{N}$ .
- Find the double root of  $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$ , given that it is approaches to 1.5.
- Solve the system of equation by Gauss Elimination method  
 $2x + 3y - z = 5, 4x + 4y - 3z = 3, 2x - 3y + 2z = 2$
- Solve the system of equation by Gauss-Jacobi's method (Three Iterations)  
 $10x - 5y - 2z = 3, 4x - 10y + 3z = -3, x + 6y + 10z = -3$

**Q.3 Solve any Three of the following.****09**

- Apply Runge- Kutta method of Fourth order to solve differential Equation given that  
 $\frac{dy}{dx} = x + y$ , given  $y = 1$ , when  $x = 0$  taking  $h = 0.1$
- Evaluate  $\int_0^1 \frac{1}{1+x^2} dx$  using  $n = 6$  by Trapezoidal rule.
- Find  $\int_0^4 e^x dx$  taking step length 1 by Simpson's  $1/3^{rd}$  rule.
- Evaluate  $\int_{-1}^1 \frac{1}{1+x^2} dx$  Using Gauss formula for  $n = 2, n = 3$ .
- Evaluate  $\int_0^1 \frac{1}{1+x} dx$  by Romberg's Integration.

**Q.4 Solve any Two of the following.****10**

- Solve the nonlinear equations by Newton Method up to two iteration  
 $x^2 + y = 11, x + y^2 = 7$  with initial approximations  $x_0 = 3.5, y_0 = -1.8$
- By the method of Factorization solve the following system of equations.  
 $x + y + z = 1, 4x + 3y - z = 6, 3x + 5y + 3z = 4$
- Apply Runge-Kutta Method to find the second approximation to the values of  $y$  and  $z$  given that  $\frac{dy}{dx} = x + z, \frac{dz}{dx} = x - y^2$  given  $y = 2, z = 1$  when  $x = 0$   
 Hence find  $y(0.1)$  and  $z(0.1)$

## Section – II

**Q.5 Solve any Three of the following.****09**

- a) Determine the following system of Equations having non trivial solution then describe the solution set  
 $3x_1 + 5x_2 - 4x_3 = 0, -3x_1 - 2x_2 + 4x_3 = 0, 6x_1 + x_2 - 8x_3 = 0$
- b) Define a linear Transformation  $T: R^2 \rightarrow R^2$  by  
 $T(x) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -x_2 \\ x_1 \end{bmatrix}$  Find the images under  $T$  of  $u = \begin{bmatrix} 4 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$
- c) Let  $V_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, V_2 = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}, V_3 = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$  Check the vectors are linearly independent or dependent.
- d) Let  $A = \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix}$  and  $u = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$  determine  $u$  belongs to Null of  $A$ .
- e) Find the dimension of the subspace  $H = \left\{ \begin{pmatrix} a - 3b + 6c \\ 5a + 4d \\ b - 2c - d \\ 5d \end{pmatrix} : a, b, c, d \text{ in } R \right\}$

**Q.6 Solve any Three of the following.****09**

- a) Determine the rank of Matrix  $A = \begin{bmatrix} 2 & 5 & -3 & -4 & 8 \\ 4 & 7 & -4 & -3 & 9 \\ 6 & 9 & -5 & 2 & 4 \\ 0 & -9 & 6 & 5 & -6 \end{bmatrix} =$
- b) Find the Eigen values of  $A = \begin{bmatrix} 2 & 3 \\ 3 & -6 \end{bmatrix}$
- c) Let  $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$  find the formula for  $A^k$  given that  $A = PDP^{-1}$  where  
 $P = \begin{bmatrix} 1 & 1 \\ -1 & -2 \end{bmatrix}$  and  $D = \begin{bmatrix} 5 & 0 \\ 0 & 3 \end{bmatrix}$
- d) Show that  $\{u_1, u_2, u_3\}$  is an orthogonal vectors where Let  
 $u_1 = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix}, u_2 = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}, u_3 = \begin{bmatrix} -1/2 \\ -2 \\ 7/2 \end{bmatrix}$
- e) Show that the quadratic form  $3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 + 2x_1x_3 - 2x_2x_3$  is positive definite.

**Q.7 Solve any Two of the following.**

- a) Let  $b_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ ,  $b_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$  and  $X = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$  and  $\beta = \{b_1, b_2\}$  find the Coordinator Vector  $[X]_\beta$  of  $X$  relative to  $\beta$
- b) Apply Power Method to  $A = \begin{bmatrix} 6 & 5 \\ 1 & 2 \end{bmatrix}$  with  $X_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$  Stop when  $k = 5$ .
- c) Find Least Square solutions of the inconsistent system  $Ax = b$  for  
 $A = \begin{bmatrix} 4 & 0 \\ 0 & 2 \\ 1 & 1 \end{bmatrix}$  and  $b = \begin{bmatrix} 2 \\ 0 \\ 11 \end{bmatrix}$

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Numerical Methods and Linear Algebra (BTN07401)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.  
 4) Use of non-programmable calculator is allowed.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Select Correct alternatives.**

**14**

- 1) Romberg's method is also known as \_\_\_\_\_.  
 a) Trapezoidal rule                      b) Simpson's 1/3rd Rule  
 c) Simpson's 3/8th Rule                d) Romberg's Integration
- 2) Gaussian Quadrature for  $n = 2$ ?  
 a)  $f\left(-\frac{1}{\sqrt{3}}\right) + f\left(-\frac{2}{\sqrt{3}}\right)$                       b)  $f\left(\frac{1}{\sqrt{3}}\right) + f\left(-\frac{1}{\sqrt{3}}\right)$   
 c)  $f\left(-\frac{1}{\sqrt{2}}\right) + f\left(-\frac{1}{\sqrt{2}}\right)$                       d) None of these
- 3) Let A be given matrix. The columns of A are linearly independent if and only if the equation  $AX = 0$   
 a) non trivial solution                      b) no solution  
 c) only trivial solution                      d) none of these
- 4) The dimension of Col A are \_\_\_\_\_.  
 a) The number of columns in A  
 b) The number of pivot columns in A  
 c) The number of rows in A  
 d) None of these
- 5) The Eigen values of the matrix are  $\begin{bmatrix} 1 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 0 & 3 \end{bmatrix}$   
 a) 1,2,3                                          b) 0,1,2  
 c) 0,2,3                                          d) 0,0,3
- 6) If inner product of two vectors  $u, v$  are orthogonal if and only if \_\_\_\_\_.  
 a)  $u \cdot v = 1$                                       b)  $u \cdot v = 2$   
 c)  $u \cdot v = 0$                                       d) None of these
- 7) Least square error in least square solution is \_\_\_\_\_.  
 a)  $\|b - Ax\|$                                       b)  $\|bAX\|$   
 c)  $\|b + AX\|$                                       d)  $\|-Ab - AX\|$

- 8) A Set of vectors are linearly independent if \_\_\_\_\_.  
a) one vector is not multiple of each other  
b) one vector is multiple of each other  
c) Zero vector  
d) none of these
- 9) Let  $A$  be  $n \times n$  symmetric matrix then quadratic form  $X'AX$  is positive definite If and only if \_\_\_\_\_.  
a) all Eigen values are negative      b) all Eigen values are nonzero  
c) all Eigen values are zero      d) all Eigen values are positive
- 10) An equation represented as  $3x - \cos x - 1 = 0$  is \_\_\_\_\_.  
a) Algebraic      b) Transcendental  
c) Both of these      d) None of these
- 11) The order of convergence of Newton-Raphson method is \_\_\_\_\_.  
a) 0      b) 2  
c) 3      d) 4
- 12) As soon as a new value for a variable is found by iteration, it is used immediately in the following equation. This method is called \_\_\_\_\_.  
a) Gauss Seidel      b) Gauss Elimination  
c) Gauss Jacobi      d) None of these
- 13) Identify the method of solving simultaneous linear equation in which coefficient matrix is expressed as the product of lower and upper triangular matrix.  
a) Gauss-Jacobi's      b) Gauss-Elimination  
c) LU-Factorization      d) Gauss-Seidal
- 14) The error in the trapezoidal rule is of the order \_\_\_\_\_.  
a)  $h$       b)  $h^2$   
c)  $h^3$       d)  $h^4$

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April-2024**  
**ELECTRICAL ENGINEERING**  
**Numerical Methods and Linear Algebra (BTN07401)**

Day & Date: Thursday, 30-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Solve any Three of the following.**

**09**

- Using Newton Raphson method to find a root of the equation  
 $x^4 - x - 10 = 0$
- Derive Newton iterative formula for  $f(x) = \sqrt{N}$ .
- Find the double root of  $x^3 - 5.4x^2 + 9.24x - 5.096 = 0$ , given that it is approaches to 1.5.
- Solve the system of equation by Gauss Elimination method  
 $2x + 3y - z = 5, 4x + 4y - 3z = 3, 2x - 3y + 2z = 2$
- Solve the system of equation by Gauss-Jacobi's method (Three Iterations)  
 $10x - 5y - 2z = 3, 4x - 10y + 3z = -3, x + 6y + 10z = -3$

**Q.3 Solve any Three of the following.**

**09**

- Apply Runge- Kutta method of Fourth order to solve differential Equation given that  
 $\frac{dy}{dx} = x + y$ , given  $y = 1$ , when  $x = 0$  taking  $h = 0.1$
- Evaluate  $\int_0^1 \frac{1}{1+x^2} dx$  using  $n = 6$  by Trapezoidal rule.
- Find  $\int_0^4 e^x dx$  taking step length 1 by Simpson's  $1/3^{rd}$  rule.
- Evaluate  $\int_{-1}^1 \frac{1}{1+x^2} dx$  Using Gauss formula for  $n = 2, n = 3$ .
- Evaluate  $\int_0^1 \frac{1}{1+x} dx$  by Romberg's Integration.

**Q.4 Solve any Two of the following.**

**10**

- Solve the nonlinear equations by Newton Method up to two iteration  
 $x^2 + y = 11, x + y^2 = 7$  with initial approximations  $x_0 = 3.5, y_0 = -1.8$
- By the method of Factorization solve the following system of equations.  
 $x + y + z = 1, 4x + 3y - z = 6, 3x + 5y + 3z = 4$
- Apply Runge-Kutta Method to find the second approximation to the values of  $y$  and  $z$  given that  $\frac{dy}{dx} = x + z, \frac{dz}{dx} = x - y^2$  given  $y = 2, z = 1$  when  $x = 0$   
 Hence find  $y(0.1)$  and  $z(0.1)$



## Section – II

**Q.5 Solve any Three of the following.****09**

- a) Determine the following system of Equations having non trivial solution then describe the solution set  
 $3x_1 + 5x_2 - 4x_3 = 0, -3x_1 - 2x_2 + 4x_3 = 0, 6x_1 + x_2 - 8x_3 = 0$
- b) Define a linear Transformation  $T: R^2 \rightarrow R^2$  by  
 $T(x) = \begin{bmatrix} 0 & -1 \\ 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} = \begin{bmatrix} -x_2 \\ x_1 \end{bmatrix}$  Find the images under  $T$  of  $u = \begin{bmatrix} 4 \\ 1 \end{bmatrix}, v = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$
- c) Let  $V_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, V_2 = \begin{bmatrix} 4 \\ 5 \\ 6 \end{bmatrix}, V_3 = \begin{bmatrix} 2 \\ 1 \\ 0 \end{bmatrix}$  Check the vectors are linearly independent or dependent.
- d) Let  $A = \begin{bmatrix} 2 & 1 \\ -4 & -2 \end{bmatrix}$  and  $u = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$  determine  $u$  belongs to Null of  $A$ .
- e) Find the dimension of the subspace  $H = \left\{ \begin{pmatrix} a - 3b + 6c \\ 5a + 4d \\ b - 2c - d \\ 5d \end{pmatrix} : a, b, c, d \text{ in } R \right\}$

**Q.6 Solve any Three of the following.****09**

- a) Determine the rank of Matrix  $A = \begin{bmatrix} 2 & 5 & -3 & -4 & 8 \\ 4 & 7 & -4 & -3 & 9 \\ 6 & 9 & -5 & 2 & 4 \\ 0 & -9 & 6 & 5 & -6 \end{bmatrix} =$
- b) Find the Eigen values of  $A = \begin{bmatrix} 2 & 3 \\ 3 & -6 \end{bmatrix}$
- c) Let  $A = \begin{bmatrix} 7 & 2 \\ -4 & 1 \end{bmatrix}$  find the formula for  $A^k$  given that  $A = PDP^{-1}$  where  
 $P = \begin{bmatrix} 1 & 1 \\ -1 & -2 \end{bmatrix}$  and  $D = \begin{bmatrix} 5 & 0 \\ 0 & 3 \end{bmatrix}$
- d) Show that  $\{u_1, u_2, u_3\}$  is an orthogonal vectors where Let  
 $u_1 = \begin{bmatrix} 3 \\ 1 \\ 1 \end{bmatrix}, u_2 = \begin{bmatrix} -1 \\ 2 \\ 1 \end{bmatrix}, u_3 = \begin{bmatrix} -1/2 \\ -2 \\ 7/2 \end{bmatrix}$
- e) Show that the quadratic form  $3x_1^2 + 5x_2^2 + 3x_3^2 - 2x_1x_2 + 2x_1x_3 - 2x_2x_3$  is positive definite.

**Q.7 Solve any Two of the following.**

- a) Let  $b_1 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$ ,  $b_2 = \begin{bmatrix} -1 \\ 1 \end{bmatrix}$  and  $X = \begin{bmatrix} 4 \\ 5 \end{bmatrix}$  and  $\beta = \{b_1, b_2\}$  find the Coordinator Vector  $[X]_\beta$  of  $X$  relative to  $\beta$
- b) Apply Power Method to  $A = \begin{bmatrix} 6 & 5 \\ 1 & 2 \end{bmatrix}$  with  $X_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$  Stop when  $k = 5$ .
- c) Find Least Square solutions of the inconsistent system  $Ax = b$  for  
 $A = \begin{bmatrix} 4 & 0 \\ 0 & 2 \\ 1 & 1 \end{bmatrix}$  and  $b = \begin{bmatrix} 2 \\ 0 \\ 11 \end{bmatrix}$

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# ELECTRICAL ENGINEERING

## Max. Marks: 70

**Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.

- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data wherever needed and mention it clearly.

## Marks: 14

14

- The capacity of batteries is expressed in terms of \_\_\_\_\_.
  - Current rating
  - Voltage rating
  - Ampere hour rating
  - None of the above
- How to increase the range on electric vehicles?
  - By increasing the battery capacity
  - By reducing battery capacity
  - By installing another DC motor
  - By installing turbocharger
- From where tractive effort generate in EV \_\_\_\_\_.
  - Battery
  - Convertor
  - Driving Shaft
  - Motor
- Which motor is suitable for high starting torque?
  - DC series motor
  - DC shunt motor
  - DC separately excited motor
  - Synchronous motor
- Which of the following vehicle produces zero emissions?
  - Gasoline vehicle
  - Electrical vehicle
  - Hybrid vehicle
  - Diesel vehicle
- Who coined the term battery?
  - George Franklin
  - Benjamin Fernandes
  - Benjamin Franklin
  - George Bush
- The Hybrid Electric Vehicle consists of \_\_\_\_\_.
  - Internal Combustion Engine + Electric Motor
  - Motor Electric 1 + Motor electric 2
  - NGV engine + Gasoline engine
  - None of above
- When was the first electric car invented?
  - 1830
  - 1985
  - 1832
  - 1945

- 9) If the force acting on body is zero. Its momentum is:  
a) Zero  
b) Constant  
c) Infinite  
d) None of the above
- 10) What is S.I. unit of force is \_\_\_\_\_.  
a) Newton- metre  
b) Newton  
c) Newton per second  
d) Newton per square metre
- 11) What is the challenge with electric vehicles?  
a) Vehicle durability  
b) Cell life  
c) Cost  
d) Both a) and b)
- 12) A fuel cells convert's \_\_\_\_\_ energy into electrical energy.  
a) Mechanical  
b) Magnetic  
c) Solar  
d) Chemical
- 13) The efficiency achieved from solar thermal energy is almost \_\_\_\_\_.  
a) 20-45%  
b) 10-40%  
c) 15-30%  
d) None of the above
- 14) The moving coil instrument measures the \_\_\_\_\_ of signal.  
a) Average value  
b) R.M.S value  
c) Zero value  
d) Half value

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**

**ELECTRICAL ENGINEERING**

**Electric Vehicle Technology (BTN07408)**

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four. 16**

- a) Explain history of vehicle in detail.
- b) State and explain laws of motion.
- c) Write note on tractive effort and transmission requirement.
- d) Explain electric vehicle market.
- e) Explain in brief vehicle kinetics.
- f) Write note on energy consumption and vehicle performance.

**Q.3 Attempt any two. 12**

- a) What is meant by Electric vehicle and explain the components of electric vehicle in brief.
- b) State and explain electric motor characteristics in detail.
- c) Explain propulsion power along with velocity and acceleration.

**Section – II**

**Q.4 Attempt any four. 16**

- a) Explain concept of plug-in hybrid electric vehicle.
- b) Explain social benefits of solar powered charging systems.
- c) Explain the integration of EV's smart grid.
- d) Explain in detail powertrain component sizing.
- e) Explain electric vehicle supply equipment.
- f) Explain different types of EV charging connector.

**Q.5 Attempt any two. 12**

- a) Explain in detail hybrid electric drive with series and parallel concept.
- b) State and explain environmental and economic benefits of solar powered charging systems.
- c) State and explain different types of plug standard in different countries.

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## Electric Vehicle Technology (BTN07408)

Time: 10:00 AM To 01:00 PM

**Instructions:**

- 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.
- 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.
- 3) Figures to the right indicates full marks.
- 4) Assume suitable data wherever needed and mention it clearly.

Marks: 14

14

- 1) When was the first electric car invented?  
a) 1830  
b) 1885  
c) 1832  
d) 1945
- 2) If the force acting on body is zero. Its momentum is:  
a) Zero  
b) Constant  
c) Infinite  
d) None of the above
- 3) What is S.I. unit of force is \_\_\_\_\_.  
a) Newton- metre  
b) Newton  
c) Newton per second  
d) Newton per square metre
- 4) What is the challenge with electric vehicles?  
a) Vehicle durability  
b) Cell life  
c) Cost  
d) Both a) and b)
- 5) A fuel cells convert's \_\_\_\_\_ energy into electrical energy.  
a) Mechanical  
b) Magnetic  
c) Solar  
d) Chemical
- 6) The efficiency achieved from solar thermal energy is almost \_\_\_\_\_.  
a) 20-45%  
b) 10-40%  
c) 15-30%  
d) None of the above
- 7) The moving coil instrument measures the \_\_\_\_\_ of signal.  
a) Average value  
b) R.M.S value  
c) Zero value  
d) Half value
- 8) The capacity of batteries is expressed in terms of \_\_\_\_\_.  
a) Current rating  
b) Voltage rating  
c) Ampere hour rating  
d) None of the above

- 9)** How to increase the range on electric vehicles?
- a) By increasing the battery capacity
  - b) By reducing battery capacity
  - c) By installing another DC motor
  - d) By installing turbocharger
- 10)** From where tractive effort generate in EV \_\_\_\_.
- a) Battery
  - b) Convertor
  - c) Driving Shaft
  - d) Motor
- 11)** Which motor is suitable for high starting torque?
- a) DC series motor
  - b) DC shunt motor
  - c) DC separately excited motor
  - d) Synchronous motor
- 12)** Which of the following vehicle produces zero emissions?
- a) Gasoline vehicle
  - b) Electrical vehicle
  - c) Hybrid vehicle
  - d) Diesel vehicle
- 13)** Who coined the term battery?
- a) George Franklin
  - b) Benjamin Fernandes
  - c) Benjamin Franklin
  - d) George Bush
- 14)** The Hybrid Electric Vehicle consists of \_\_\_\_.
- a) Internal Combustion Engine + Electric Motor
  - b) Motor Electric 1 + Motor electric 2
  - c) NGV engine + Gasoline engine
  - d) None of above

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**

**ELECTRICAL ENGINEERING**

**Electric Vehicle Technology (BTN07408)**

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four.** **16**

- a) Explain history of vehicle in detail.
- b) State and explain laws of motion.
- c) Write note on tractive effort and transmission requirement.
- d) Explain electric vehicle market.
- e) Explain in brief vehicle kinetics.
- f) Write note on energy consumption and vehicle performance.

**Q.3 Attempt any two.** **12**

- a) What is meant by Electric vehicle and explain the components of electric vehicle in brief.
- b) State and explain electric motor characteristics in detail.
- c) Explain propulsion power along with velocity and acceleration.

**Section – II**

**Q.4 Attempt any four.** **16**

- a) Explain concept of plug-in hybrid electric vehicle.
- b) Explain social benefits of solar powered charging systems.
- c) Explain the integration of EV's smart grid.
- d) Explain in detail powertrain component sizing.
- e) Explain electric vehicle supply equipment.
- f) Explain different types of EV charging connector.

**Q.5 Attempt any two.** **12**

- a) Explain in detail hybrid electric drive with series and parallel concept.
- b) State and explain environmental and economic benefits of solar powered charging systems.
- c) State and explain different types of plug standard in different countries.



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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**

**ELECTRICAL ENGINEERING**

**Electric Vehicle Technology (BTN07408)**

Day & Date: Saturday, 01-06-2024

Max. Marks: 70

Time: 10:00 AM To 01:00 PM

- Instructions:** 1) Q. No. 1 is compulsory and should be solved in first 30 minutes in Answer Book. Page No.3 (starting page of the Answer Book). Each question carry one mark.  
 2) Don't forget to mention Question Paper Set (P/Q/R/S) at the top of the same page.  
 3) Figures to the right indicates full marks.  
 4) Assume suitable data wherever needed and mention it clearly.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks: 14

**Q.1 Choose the correct option from the following.**

**14**

- 1) What is the challenge with electric vehicles?
  - a) Vehicle durability
  - b) Cell life
  - c) Cost
  - d) Both a) and b)
- 2) A fuel cells convert's \_\_\_\_\_ energy into electrical energy.
  - a) Mechanical
  - b) Magnetic
  - c) Solar
  - d) Chemical
- 3) The efficiency achieved from solar thermal energy is almost \_\_\_\_\_.
  - a) 20-45%
  - b) 10-40%
  - c) 15-30%
  - d) None of the above
- 4) The moving coil instrument measures the \_\_\_\_\_ of signal.
  - a) Average value
  - b) R.M.S value
  - c) Zero value
  - d) Half value
- 5) The capacity of batteries is expressed in terms of \_\_\_\_\_.
  - a) Current rating
  - b) Voltage rating
  - c) Ampere hour rating
  - d) None of the above
- 6) How to increase the range on electric vehicles?
  - a) By increasing the battery capacity
  - b) By reducing battery capacity
  - c) By installing another DC motor
  - d) By installing turbocharger
- 7) From where tractive effort generate in EV \_\_\_\_\_.
  - a) Battery
  - b) Convertor
  - c) Driving Shaft
  - d) Motor
- 8) Which motor is suitable for high starting torque?
  - a) DC series motor
  - b) DC shunt motor
  - c) DC separately excited motor
  - d) Synchronous motor



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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**

**ELECTRICAL ENGINEERING**

**Electric Vehicle Technology (BTN07408)**

Day & Date: Saturday, 01-06-2024  
Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four. 16**

- a) Explain history of vehicle in detail.
- b) State and explain laws of motion.
- c) Write note on tractive effort and transmission requirement.
- d) Explain electric vehicle market.
- e) Explain in brief vehicle kinetics.
- f) Write note on energy consumption and vehicle performance.

**Q.3 Attempt any two. 12**

- a) What is meant by Electric vehicle and explain the components of electric vehicle in brief.
- b) State and explain electric motor characteristics in detail.
- c) Explain propulsion power along with velocity and acceleration.

**Section – II**

**Q.4 Attempt any four. 16**

- a) Explain concept of plug-in hybrid electric vehicle.
- b) Explain social benefits of solar powered charging systems.
- c) Explain the integration of EV's smart grid.
- d) Explain in detail powertrain component sizing.
- e) Explain electric vehicle supply equipment.
- f) Explain different types of EV charging connector.

**Q.5 Attempt any two. 12**

- a) Explain in detail hybrid electric drive with series and parallel concept.
- b) State and explain environmental and economic benefits of solar powered charging systems.
- c) State and explain different types of plug standard in different countries.

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# ELECTRICAL ENGINEERING

## Max. Marks: 70

4) Assume suitable data wherever needed and mention it clearly.

## Marks: 14

14

- Page 10 of 12

- 9) The moving coil instrument measures the \_\_\_\_\_ of signal.
  - a) Average value
  - b) R.M.S value
  - c) Zero value
  - d) Half value
- 10) The capacity of batteries is expressed in terms of \_\_\_\_\_.
  - a) Current rating
  - b) Voltage rating
  - c) Ampere hour rating
  - d) None of the above
- 11) How to increase the range on electric vehicles?
  - a) By increasing the battery capacity
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  - d) Motor
- 13) Which motor is suitable for high starting torque?
  - a) DC series motor
  - b) DC shunt motor
  - c) DC separately excited motor
  - d) Synchronous motor
- 14) Which of the following vehicle produces zero emissions?
  - a) Gasoline vehicle
  - b) Electrical vehicle
  - c) Hybrid vehicle
  - d) Diesel vehicle

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**S.Y. (B.Tech.) (Sem - II) (New) (CBCS) Examination: March/April - 2024**

**ELECTRICAL ENGINEERING**

**Electric Vehicle Technology (BTN07408)**

Day & Date: Saturday, 01-06-2024

Max. Marks: 56

Time: 10:00 AM To 01:00 PM

**Instructions:** 1) All questions are compulsory.  
2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any four.** **16**

- a) Explain history of vehicle in detail.
- b) State and explain laws of motion.
- c) Write note on tractive effort and transmission requirement.
- d) Explain electric vehicle market.
- e) Explain in brief vehicle kinetics.
- f) Write note on energy consumption and vehicle performance.

**Q.3 Attempt any two.** **12**

- a) What is meant by Electric vehicle and explain the components of electric vehicle in brief.
- b) State and explain electric motor characteristics in detail.
- c) Explain propulsion power along with velocity and acceleration.

**Section – II**

**Q.4 Attempt any four.** **16**

- a) Explain concept of plug-in hybrid electric vehicle.
- b) Explain social benefits of solar powered charging systems.
- c) Explain the integration of EV's smart grid.
- d) Explain in detail powertrain component sizing.
- e) Explain electric vehicle supply equipment.
- f) Explain different types of EV charging connector.

**Q.5 Attempt any two.** **12**

- a) Explain in detail hybrid electric drive with series and parallel concept.
- b) State and explain environmental and economic benefits of solar powered charging systems.
- c) State and explain different types of plug standard in different countries.

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## Max. Marks: 70

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
3) Figures to the right indicates full marks.

Marks:14

## 14

- Page 1 of 16

- Page 2 of 16



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Set **P**

**F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024**  
**Engineering Mathematics – I (BTN10103)**

Day & Date: Monday, 13-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any THREE questions from the following.** **09**

- Find the nth derivative of  $y = \sin x \cos x$
- Verify Cayley Hamilton theorem for  $A$  where  $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$
- Investigate for what value of  $\mu$  and  $\lambda$  the equations  $2x + 3y + 5z = 9$ ,  $7x + 3y - 2z = 8$ ,  $2x + 3y + \lambda z = \mu$  will have (a.) no solution, (b.) infinite solution, (c.) unique solution.
- Expand  $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$  in power of  $(x - 1)$
- Expand  $\sec x$  in powers of  $x$  up to  $x^4$

**Q.3 Attempt any THREE questions from the following.** **09**

- Find the nth derivative of  $y = \frac{x+1}{x-1}$
- Prove that  $\tan^{-1} \left( \frac{\sqrt{1+x^2}-1}{x} \right) = \frac{1}{2} \left[ x + \frac{x^3}{3} + \frac{x^5}{5} + \dots \right]$
- Find the nth derivative of  $y = e^x \cdot x \cdot \cos x$ .
- Examine the vector for Linear Dependence and Independence  $[1,1,1], [1,2,3], [2,3,8]$
- Find the rank of the matrix by reducing it to Normal for  $\begin{pmatrix} 3 & 2 & 1 & 1 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ 5 & 7 & 4 & 10 \end{pmatrix}$

**Q.4 Attempt any TWO questions from the following.** **10**

- If  $\sin^{-1} \left( \frac{y}{b} \right) = \log \left( \frac{x}{n} \right)^n$  then prove that  $x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$
- Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for  $A = \begin{pmatrix} 8 & -8 & -2 \\ 0 & -3 & -2 \\ 0 & 0 & 1 \end{pmatrix}$
- Find the value of  $a, b, c$  if  $\lim_{x \rightarrow 0} \frac{x(a + b \cos x) - c \sin x}{x^5} = 1$

## Section – II

**Q.5 Attempt any THREE questions from the following.****09**

- a) Prove that  $\text{curl}(\vec{r}) = 0$ .
- b) Find the directional derivative of  $\phi = x^2y \cos z$  at  $(1, 2, \pi/2)$  in the direction of  $2i + 3j + 2k$ .
- c) If  $u = \log(\tan x + \tan y + \tan z)$   
Find the value of  $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z}$
- d) If  $(\cos x)^y = (\sin y)^x$  find  $\frac{\partial y}{\partial x}$
- e) Find the percentage error in  $g$  if the percentage errors in  $l$  and  $T$  are both  $-1$  for case of simple pendulum and the relation is  $T = \frac{1}{2\pi} \sqrt{\frac{l}{g}}$

**Q.6 Attempt any THREE questions from the following.****09**

- a) If  $u = F(e^{x-y}, e^{y-z}, e^{z-x})$  Prove that  $u_x + u_y + u_z = 0$
- b) If  $x = a \cosh u \cos v, y = a \sinh u \sin v$  find  $\frac{\partial(x,y)}{\partial(u,v)}$   
(Note: Derivative of  $\cosh x$  is  $\sinh x$ , derivative of  $\sinh x$  is  $\cosh x$  w.r.t.  $x$ )
- c) Find the angle between the normal to the surfaces  $x^2y + z = 3$  and  $x \log z - y^2 + 4 = 0$  at  $(-1, 2, 1)$ .
- d) A particle moves along the curve  $\vec{r} = (t^3 - 4t)i + (t^2 + 4t)j + (8t^2 - 3t^3)k$  where  $t$  denotes time. Show that the magnitudes of acceleration along the tangent and normal at  $t = 2$  are 16 and  $2\sqrt{73}$  respectively.
- e) Find the value of  $\nabla r^3$ .

**Q.7 Attempt any TWO questions from the following.****10**

- a) If  $u = \cos^{-1} \left[ \frac{x^{1/4} - y^{1/4}}{x^{1/5} - y^{1/4}} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$
- b) Find the stationary value of  $xy - x^2y - xy^2$
- c) Prove that  $\vec{F} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$  is irrotational. Find the function  $\phi$  such that  $\vec{F} = \nabla \phi$

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Set **Q**

**F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024**  
**Engineering Mathematics – I (BTN10103)**

Day & Date: Monday, 13-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct option.**

**14**

- 1)  $\nabla \times \vec{r} = ?$ 
  - a)  $i + j + k$
  - b) 0
  - c) 3
  - d)  $\sqrt{3}$
- 2) If  $\vec{a}$  is constant vector and  $\vec{r} = xi + yj + zk$  then  $\text{grad} (\vec{a} \cdot \vec{r}) = \underline{\hspace{2cm}}$ .
  - a)  $2\vec{a}$
  - b)  $\vec{a}$
  - c)  $\vec{r}$
  - d)  $2\vec{r}$
- 3) If  $u = e^{y^2 z^3}$  then  $\frac{\partial u}{\partial z} = \underline{\hspace{2cm}}$ .
  - a)  $e^{y^2 z^3} y^2 z^3$
  - b)  $e^{y^2 z^3} y^2 z^2$
  - c)  $e^{y^2 z^3} 3y^2 z^2$
  - d)  $e^{y^2 z^3} 2yz^3$
- 4) If  $f(x, y, z) = 0$  then the value of  $\frac{\partial z}{\partial x} = \underline{\hspace{2cm}}$ .
  - a)  $\frac{f_x}{f_z}$
  - b)  $\frac{f_z}{f_x}$
  - c)  $-\frac{f_z}{f_x}$
  - d)  $-\frac{f_x}{f_z}$
- 5) If  $u = xy, v = x + y$  Then the value of  $J\left(\frac{u,v}{x,y}\right) = \underline{\hspace{2cm}}$ .
  - a)  $x - y$
  - b) 0
  - c)  $x + y$
  - d) 1
- 6) The percentage error in the area of a square when an error of 2% is made in measuring its length is  $\underline{\hspace{2cm}}$ .
  - a) 1
  - b) 2
  - c) 3
  - d) 4
- 7) Directional derivative is maximum along  $\underline{\hspace{2cm}}$ .
  - a) Any unit vector
  - b) Co-ordinate axes
  - c) Tangent to the surface
  - d) Normal to the surface
- 8) If  $y = x^n - 1$  then  $y_n = \underline{\hspace{2cm}}$ .
  - a) 0
  - b)  $n!$
  - c) 1
  - d)  $(n - 1)!$

- 9) If  $y = \cos 2x$  then  $y_n =$  \_\_\_\_.
- a)  $-2^n \cos\left(2x + \frac{n\pi}{2}\right)$       b)  $2^n \cos\left(x + \frac{n\pi}{2}\right)$
- c)  $2^{n-1} \sin\left(2x + \frac{n\pi}{2}\right)$       d)  $2^{n+1} \sin\left(\frac{n\pi}{2}\right)$
- 10) If  $L = \lim_{x \rightarrow \infty} x^5 e^{-x}$  then  $L =$  \_\_\_\_.
- a) 0      b) 1
- c) 2      d) -2
- 11) If  $y = \log 3x$  the  $y_n =$  \_\_\_\_.
- a)  $\frac{(-1)^n(n)!}{x^n}$       b)  $\frac{(-1)^n(n-1)!}{x^n}$
- c)  $\frac{(-1)^{n-1}(n)!}{x^{n+1}}$       d)  $\frac{(-1)^{n-1}(n-1)!}{x^n}$
- 12) The expansion of  $y(x+h)$  in powers of  $x$  is = \_\_\_\_.
- a)  $y(x) + hy'(x) + \frac{h^2}{2!}y''(x) + \dots$       b)  $y(h) + xy'(h) + \frac{x^2}{2!}y''(h) + \dots$
- c)  $y(h) - xy'(h) + \frac{x^2}{2!}y''(h) - \dots$       d)  $y(x) - hy'(x) + \frac{h^2}{2!}y''(x) - \dots$
- 13) If  $a \neq 0$  then the rank of matrix  $A$  is where  $A = \begin{pmatrix} c & c & c \\ a & a & a \\ a & a & a \end{pmatrix}$
- a) 2      b)  $a$
- c) 0      d) 1
- 14) If 1, 2, 7 are eigen values and 4, 3,  $K$  are diagonal elements of matrix  $[A]_{3 \times 3}$ , then the value of  $K$  equals \_\_\_\_.
- a) 0      b) 1
- c) 2      d) 3

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Set **Q**

**F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024**  
**Engineering Mathematics – I (BTN10103)**

Day & Date: Monday, 13-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any THREE questions from the following.** **09**

- a) Find the nth derivative of  $y = \sin x \cos x$
- b) Verify Cayley Hamilton theorem for  $A$  where  $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$
- c) Investigate for what value of  $\mu$  and  $\lambda$  the equations  $2x + 3y + 5z = 9$ ,  $7x + 3y - 2z = 8$ ,  $2x + 3y + \lambda z = \mu$  will have (a.) no solution, (b.) infinite solution, (c.) unique solution.
- d) Expand  $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$  in power of  $(x - 1)$
- e) Expand  $\sec x$  in powers of  $x$  up to  $x^4$

**Q.3 Attempt any THREE questions from the following.** **09**

- a) Find the nth derivative of  $y = \frac{x+1}{x-1}$
- b) Prove that  $\tan^{-1} \left( \frac{\sqrt{1+x^2}-1}{x} \right) = \frac{1}{2} \left[ x + \frac{x^3}{3} + \frac{x^5}{5} + \dots \right]$
- c) Find the nth derivative of  $y = e^x \cdot x \cdot \cos x$ .
- d) Examine the vector for Linear Dependence and Independence  $[1,1,1], [1,2,3], [2,3,8]$
- e) Find the rank of the matrix by reducing it to Normal for  $\begin{pmatrix} 3 & 2 & 1 & 1 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ 5 & 7 & 4 & 10 \end{pmatrix}$

**Q.4 Attempt any TWO questions from the following.** **10**

- a) If  $\sin^{-1} \left( \frac{y}{b} \right) = \log \left( \frac{x}{n} \right)^n$  then prove that  $x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$
- b) Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for  $A = \begin{pmatrix} 8 & -8 & -2 \\ 0 & -3 & -2 \\ 0 & 0 & 1 \end{pmatrix}$
- c) Find the value of  $a, b, c$  if  $\lim_{x \rightarrow 0} \frac{x(a + b \cos x) - c \sin x}{x^5} = 1$

## Section – II

**Q.5 Attempt any THREE questions from the following.****09**

- Prove that  $\text{curl}(\vec{r}) = 0$ .
- Find the directional derivative of  $\phi = x^2y \cos z$  at  $(1, 2, \pi/2)$  in the direction of  $2i + 3j + 2k$ .
- If  $u = \log(\tan x + \tan y + \tan z)$   
Find the value of  $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z}$
- If  $(\cos x)^y = (\sin y)^x$  find  $\frac{\partial y}{\partial x}$
- Find the percentage error in  $g$  if the percentage errors in  $l$  and  $T$  are both  $-1$  for case of simple pendulum and the relation is  $T = \frac{1}{2\pi} \sqrt{\frac{l}{g}}$

**Q.6 Attempt any THREE questions from the following.****09**

- If  $u = F(e^{x-y}, e^{y-z}, e^{z-x})$  Prove that  $u_x + u_y + u_z = 0$
- If  $x = a \cosh u \cos v, y = a \sinh u \sin v$  find  $\frac{\partial(x,y)}{\partial(u,v)}$   
(Note: Derivative of  $\cosh x$  is  $\sinh x$ , derivative of  $\sinh x$  is  $\cosh x$  w.r.t.  $x$ )
- Find the angle between the normal to the surfaces  $x^2y + z = 3$  and  $x \log z - y^2 + 4 = 0$  at  $(-1, 2, 1)$ .
- A particle moves along the curve  $\vec{r} = (t^3 - 4t)i + (t^2 + 4t)j + (8t^2 - 3t^3)k$  where  $t$  denotes time. Show that the magnitudes of acceleration along the tangent and normal at  $t = 2$  are 16 and  $2\sqrt{73}$  respectively.
- Find the value of  $\nabla r^3$ .

**Q.7 Attempt any TWO questions from the following.****10**

- If  $u = \cos^{-1} \left[ \frac{x^{1/4} - y^{1/4}}{x^{1/5} - y^{1/4}} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$
- Find the stationary value of  $xy - x^2y - xy^2$
- Prove that  $\vec{F} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$  is irrotational. Find the function  $\phi$  such that  $\vec{F} = \nabla \phi$

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Set **R**

**F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024**  
**Engineering Mathematics – I (BTN10103)**

Day & Date: Monday, 13-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 70

- Instructions:** 1) Q. No. 1 is compulsory. It should be solved in the first 30 minutes in answer book Page no 03 (Starting page of the Answer Book). Each question carries one mark.  
 2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
 3) Figures to the right indicates full marks.

**MCQ/Objective Type Questions**

Duration: 30 Minutes

Marks:14

**Q.1 Choose the correct option.**

**14**

- 1) If  $f(x, y, z) = 0$  then the value of  $\frac{\partial z}{\partial x} =$  \_\_\_\_\_.
  - a)  $\frac{f_x}{f_z}$
  - b)  $\frac{f_z}{f_x}$
  - c)  $-\frac{f_z}{f_x}$
  - d)  $-\frac{f_x}{f_z}$
- 2) If  $u = xy, v = x + y$  Then the value of  $J\left(\frac{u,v}{x,y}\right) =$  \_\_\_\_\_.
  - a)  $x - y$
  - b) 0
  - c)  $x + y$
  - d) 1
- 3) The percentage error in the area of a square when an error of 2% is made in measuring its length is \_\_\_\_\_.
  - a) 1
  - b) 2
  - c) 3
  - d) 4
- 4) Directional derivative is maximum along \_\_\_\_\_.
  - a) Any unit vector
  - b) Co-ordinate axes
  - c) Tangent to the surface
  - d) Normal to the surface
- 5) If  $y = x^n - 1$  then  $y_n =$  \_\_\_\_\_.
  - a) 0
  - b)  $n!$
  - c) 1
  - d)  $(n - 1)!$
- 6) If  $y = \cos 2x$  then  $y_n =$  \_\_\_\_\_.
  - a)  $-2^n \cos\left(2x + \frac{n\pi}{2}\right)$
  - b)  $2^n \cos\left(x + \frac{n\pi}{2}\right)$
  - c)  $2^{n-1} \sin\left(2x + \frac{n\pi}{2}\right)$
  - d)  $2^{n+1} \sin\left(\frac{n\pi}{2}\right)$
- 7) If  $L = \lim_{x \rightarrow \infty} x^5 e^{-x}$  then  $L =$  \_\_\_\_\_.
  - a) 0
  - b) 1
  - c) 2
  - d) -2

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Set **R**

**F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024**  
**Engineering Mathematics – I (BTN10103)**

Day & Date: Monday, 13-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any THREE questions from the following.** **09**

- Find the nth derivative of  $y = \sin x \cos x$
- Verify Cayley Hamilton theorem for  $A$  where  $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$
- Investigate for what value of  $\mu$  and  $\lambda$  the equations  $2x + 3y + 5z = 9$ ,  $7x + 3y - 2z = 8$ ,  $2x + 3y + \lambda z = \mu$  will have (a.) no solution, (b.) infinite solution, (c.) unique solution.
- Expand  $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$  in power of  $(x - 1)$
- Expand  $\sec x$  in powers of  $x$  up to  $x^4$

**Q.3 Attempt any THREE questions from the following.** **09**

- Find the nth derivative of  $y = \frac{x+1}{x-1}$
- Prove that  $\tan^{-1} \left( \frac{\sqrt{1+x^2}-1}{x} \right) = \frac{1}{2} \left[ x + \frac{x^3}{3} + \frac{x^5}{5} + \dots \right]$
- Find the nth derivative of  $y = e^x \cdot x \cdot \cos x$ .
- Examine the vector for Linear Dependence and Independence  $[1,1,1], [1,2,3], [2,3,8]$
- Find the rank of the matrix by reducing it to Normal for  $\begin{pmatrix} 3 & 2 & 1 & 1 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ 5 & 7 & 4 & 10 \end{pmatrix}$

**Q.4 Attempt any TWO questions from the following.** **10**

- If  $\sin^{-1} \left( \frac{y}{b} \right) = \log \left( \frac{x}{n} \right)^n$  then prove that  $x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$
- Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for  $A = \begin{pmatrix} 8 & -8 & -2 \\ 0 & -3 & -2 \\ 0 & 0 & 1 \end{pmatrix}$
- Find the value of  $a, b, c$  if  $\lim_{x \rightarrow 0} \frac{x(a + b \cos x) - c \sin x}{x^5} = 1$

## Section – II

**Q.5 Attempt any THREE questions from the following.****09**

- a) Prove that  $\text{curl}(\vec{r}) = 0$ .
- b) Find the directional derivative of  $\phi = x^2y \cos z$  at  $(1, 2, \pi/2)$  in the direction of  $2i + 3j + 2k$ .
- c) If  $u = \log(\tan x + \tan y + \tan z)$   
Find the value of  $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z}$
- d) If  $(\cos x)^y = (\sin y)^x$  find  $\frac{\partial y}{\partial x}$
- e) Find the percentage error in  $g$  if the percentage errors in  $l$  and  $T$  are both  $-1$  for case of simple pendulum and the relation is  $T = \frac{1}{2\pi} \sqrt{\frac{l}{g}}$

**Q.6 Attempt any THREE questions from the following.****09**

- a) If  $u = F(e^{x-y}, e^{y-z}, e^{z-x})$  Prove that  $u_x + u_y + u_z = 0$
- b) If  $x = a \cosh u \cos v, y = a \sinh u \sin v$  find  $\frac{\partial(x,y)}{\partial(u,v)}$   
(Note: Derivative of  $\cosh x$  is  $\sinh x$ , derivative of  $\sinh x$  is  $\cosh x$  w.r.t.  $x$ )
- c) Find the angle between the normal to the surfaces  $x^2y + z = 3$  and  $x \log z - y^2 + 4 = 0$  at  $(-1, 2, 1)$ .
- d) A particle moves along the curve  $\vec{r} = (t^3 - 4t)i + (t^2 + 4t)j + (8t^2 - 3t^3)k$  where  $t$  denotes time. Show that the magnitudes of acceleration along the tangent and normal at  $t = 2$  are 16 and  $2\sqrt{73}$  respectively.
- e) Find the value of  $\nabla r^3$ .

**Q.7 Attempt any TWO questions from the following.****10**

- a) If  $u = \cos^{-1} \left[ \frac{x^{1/4} - y^{1/4}}{x^{1/5} - y^{1/4}} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$
- b) Find the stationary value of  $xy - x^2y - xy^2$
- c) Prove that  $\vec{F} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$  is irrotational. Find the function  $\phi$  such that  $\vec{F} = \nabla \phi$

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## Max. Marks: 70

2) Don't forget to Mention question paper set (P/Q/R/S) on top of page.  
3) Figures to the right indicates full marks.

Marks:14

14

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Set **S**

**F. Y. (B.Tech.) (Sem - I) (CBCS) Examination: March/April-2024**  
**Engineering Mathematics – I (BTN10103)**

Day & Date: Monday, 13-05-2024  
 Time: 10:00 AM To 01:00 PM

Max. Marks: 56

**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

**Section – I**

**Q.2 Attempt any THREE questions from the following.**

09

- Find the nth derivative of  $y = \sin x \cos x$
- Verify Cayley Hamilton theorem for  $A$  where  $A = \begin{pmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{pmatrix}$
- Investigate for what value of  $\mu$  and  $\lambda$  the equations  $2x + 3y + 5z = 9$ ,  $7x + 3y - 2z = 8$ ,  $2x + 3y + \lambda z = \mu$  will have (a.) no solution, (b.) infinite solution, (c.) unique solution.
- Expand  $x^5 - 5x^4 + 6x^3 - 7x^2 + 8x - 9$  in power of  $(x - 1)$
- Expand  $\sec x$  in powers of  $x$  up to  $x^4$

**Q.3 Attempt any THREE questions from the following.**

09

- Find the nth derivative of  $y = \frac{x+1}{x-1}$
- Prove that  $\tan^{-1} \left( \frac{\sqrt{1+x^2}-1}{x} \right) = \frac{1}{2} \left[ x + \frac{x^3}{3} + \frac{x^5}{5} + \dots \right]$
- Find the nth derivative of  $y = e^x \cdot x \cdot \cos x$ .
- Examine the vector for Linear Dependence and Independence  $[1,1,1], [1,2,3], [2,3,8]$
- Find the rank of the matrix by reducing it to Normal for  $\begin{pmatrix} 3 & 2 & 1 & 1 \\ -1 & 3 & 2 & 2 \\ 2 & 5 & 3 & 6 \\ 5 & 7 & 4 & 10 \end{pmatrix}$

**Q.4 Attempt any TWO questions from the following.**

10

- If  $\sin^{-1} \left( \frac{y}{b} \right) = \log \left( \frac{x}{n} \right)^n$  then prove that  $x^2 y_{n+2} + (2n+1)xy_{n+1} + 2n^2 y_n = 0$
- Find the Eigen Values and Eigen Vector for the Smallest Eigen Value for  $A = \begin{pmatrix} 8 & -8 & -2 \\ 0 & -3 & -2 \\ 0 & 0 & 1 \end{pmatrix}$
- Find the value of  $a, b, c$  if  $\lim_{x \rightarrow 0} \frac{x(a + b \cos x) - c \sin x}{x^5} = 1$

## Section – II

**Q.5 Attempt any THREE questions from the following.****09**

- Prove that  $\text{curl}(\vec{r}) = 0$ .
- Find the directional derivative of  $\phi = x^2y \cos z$  at  $(1, 2, \pi/2)$  in the direction of  $2i + 3j + 2k$ .
- If  $u = \log(\tan x + \tan y + \tan z)$   
Find the value of  $\sin 2x \frac{\partial u}{\partial x} + \sin 2y \frac{\partial u}{\partial y} + \sin 2z \frac{\partial u}{\partial z}$
- If  $(\cos x)^y = (\sin y)^x$  find  $\frac{\partial y}{\partial x}$
- Find the percentage error in  $g$  if the percentage errors in  $l$  and  $T$  are both  $-1$  for case of simple pendulum and the relation is  $T = \frac{1}{2\pi} \sqrt{\frac{l}{g}}$

**Q.6 Attempt any THREE questions from the following.****09**

- If  $u = F(e^{x-y}, e^{y-z}, e^{z-x})$  Prove that  $u_x + u_y + u_z = 0$
- If  $x = a \cosh u \cos v, y = a \sinh u \sin v$  find  $\frac{\partial(x,y)}{\partial(u,v)}$   
(Note: Derivative of  $\cosh x$  is  $\sinh x$ , derivative of  $\sinh x$  is  $\cosh x$  w.r.t.  $x$ )
- Find the angle between the normal to the surfaces  $x^2y + z = 3$  and  $x \log z - y^2 + 4 = 0$  at  $(-1, 2, 1)$ .
- A particle moves along the curve  $\vec{r} = (t^3 - 4t)i + (t^2 + 4t)j + (8t^2 - 3t^3)k$  where  $t$  denotes time. Show that the magnitudes of acceleration along the tangent and normal at  $t = 2$  are 16 and  $2\sqrt{73}$  respectively.
- Find the value of  $\nabla r^3$ .

**Q.7 Attempt any TWO questions from the following.****10**

- If  $u = \cos^{-1} \left[ \frac{x^{1/4} - y^{1/4}}{x^{1/5} - y^{1/4}} \right]$  then find the value of  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y}$  and  $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$
- Find the stationary value of  $xy - x^2y - xy^2$
- Prove that  $\vec{F} = (x^2 - yz)i + (y^2 - zx)j + (z^2 - xy)k$  is irrotational. Find the function  $\phi$  such that  $\vec{F} = \nabla \phi$