SLR-EP – 1

Seat	
No.	

F.E. (Part - I) (New-CBCS) Examination, 2016 **ENGINEERING MATHEMATICS – I**

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

- 2) Figures to right indicate full marks.
- 3) **Use** of non-programmable calculator is allowed.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

- 1. Choose the correct answer:
 - - c) $2^{n-1} \cdot \sin(2x + n\pi/2)$
- d) $2^{n+1} \sin \left(2x n \frac{\pi}{2}\right)$
- - a) 8
- b) $\frac{1}{9}$ c) 4
- 3) The principal value of log (i) = _____
 - a) 0

- b) $i\pi$ c) $2\pi i$
- d) $i\frac{\pi}{2}$

- 4) If $y = \frac{1}{(x+3)^3}$ then $y_n =$ _____

- a) $\frac{(-1)^n \cdot (n+2)!}{(x+3)^{n+2}}$ b) $\frac{(-1)^n \cdot (n+1)!}{(x+3)^{n+3}}$ c) $\frac{(-1)^{n-1} \cdot (n+1)!}{(x+3)^{n+3}}$ d) $\frac{(-1)^n \cdot n!}{(x+3)^{n+1}} \cdot 3^n$
- 5) The first three terms in expansion of e^x tanx are

 - a) $x + \frac{x^2}{2} + \frac{x^3}{3}$ b) $x + \frac{x^3}{3} + \frac{2}{5}x^5$ c) $x + x^2 + \frac{5}{6}x^3$ d) $x + \frac{x^3}{3} + \frac{x^5}{6}$



- 6) Cosh(x + iy) =

 - a) $\cosh x \cdot \cosh y + i \sinh x \cdot \sinh y$ b) $\cosh x \cdot \cosh y i \sinh x \cdot \sinh y$
 - c) $\cosh x \cdot \cosh y i \sinh x \cdot \sin y$ d) $\cosh x \cdot \cos y + i \sinh x \cdot \sin y$
- 7) The value of $\lim_{x\to 0} \frac{x-\sin x}{x^3}$ is _____

 - a) $\frac{1}{6}$ b) $-\frac{1}{6}$ c) 0
- 8) If the characteristic equation of a matrix A is $\lambda^2 2\lambda + 1 = 0$ then
 - a) $A^{-1} = A 2I$

b) $A^{-1} = 2I - A$

c) $A^{-1} = A^2 - 2A$

- d) A^{-1} does not exist
- 9) The rank of the matrix 2 2 2 3 1 1 1 is 3 3 3
 - a) 1

- b) 2
- c) 3
- d) 0
- 10) Let A be 3×3 matrix of rank 3 then the solution of A X = 0 is
 - a) No solution

- b) One independent parameter
- c) Three independent parameter
- d) A trivial solution
- 11) If $z = \log (x \tan^{-1} y)$ then $\frac{\partial^2 z}{\partial x \partial v} = \underline{\hspace{1cm}}$
- a) $\frac{x}{1+y^2}$ b) $\frac{1}{x}$ c) $\frac{1}{x(1+y^2)}$
- d) 0
- 12) If $u = \frac{\sqrt{x^3 + y^3}}{x + y}$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \underline{\hspace{1cm}}$
 - a) $\frac{3u}{2}$ b) $\frac{u}{2}$ c) 0
- d) 2u
- 13) If u = x y, v = xy, then $\frac{\partial (u, v)}{\partial (x, y)} = \underline{\hspace{1cm}}$
 - a) x v
- b) y x
- d) x + y
- 14) The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to
 - a) 1%
- b) 3%
- c) 2%
- d) 0%



Seat No.

F.E. (Part – I) (New-CBCS) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

SECTION - I

2. Attempt any three of the following:

a) Find nth derivative of
$$\frac{x^2 + 4x + 1}{x^3 + 2x^2 - x - 2}$$
.

b) If $y = \sin^2 x \cdot \cos^3 x$ then find y_n .

c) Prove that
$$\sec^2 x = 1 + x^2 + \frac{2x^4}{3} + \dots$$

d) Expand f (x) = $x^5 - x^4 + x^3 - x^2 + x - 1$ in powers of (x – 1) and hence find F (0.99).

e) Simplify
$$\left(\frac{1}{\sqrt{2}} + i\frac{1}{\sqrt{2}}\right)^{4/3} + \left(\frac{1}{\sqrt{2}} - i\frac{1}{\sqrt{2}}\right)^{4/3}$$
.

3. Attempt any three of the following:

a) Evaluate
$$\lim_{x \to 1} (1 + \sec \pi x) \tan \left(\frac{\pi x}{2}\right)$$
.

b) Evaluate
$$\lim_{x \to 1} (1 - x^2)^{\frac{1}{\log(1 - x)}}$$
.

c) Solve
$$x^5 + 1 = 0$$
.



- d) Show that continued product of all values of $\left(\frac{1}{2} i \frac{\sqrt{3}}{2}\right)^{4}$ is 1. 3
- e) If $\sin (\theta + i\phi) = P(\cos \alpha + i \sin \alpha)$ then prove that $P^2 = \frac{1}{2}(\cosh 2\phi \cos 2\theta)$. 3
- 4. Attempt any two of the following:
 - a) If $y = \left(x + \sqrt{x^2 + a^2}\right)^m$ then prove that $(x^2 + a^2) y_{n+2} + (2n + 1) xy_{n+1} + (n^2 - m^2) y_n = 0$ and hence prove that $a^2 \cdot y_{n+2}(0) = (m^2 - n^2)y_n(0).$ 5
 - b) Expand $tan^{-1} \left(\frac{\sqrt{1 + x^2} 1}{x} \right)$ in powers of x. 5
 - 5 c) If $\cos(x + iy) = \cos \alpha + i\sin \alpha$ then prove that :
 - i) $y = \frac{1}{2} \log \left| \frac{\sin(x \alpha)}{\sin(x + \alpha)} \right|$
 - ii) cos2x + cosh2y = 2.

SECTION - II

5. Solve any three:

9

a) Reduce the matrix A to its normal form when $A = \begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ 0 & 4 & 0 & 4 \end{bmatrix}$ hence

find the rank of A.

- b) Test for consistency and solve the following systems of equations 2x - y + 3z = 8, -x + 2y + z = 4, 3x + y - 4z = 0.
- c) If $u = e^x$ (x cosy y siny) prove that $\frac{\partial^2 u}{\partial v^2} + \frac{\partial^2 u}{\partial v^2} = 0$.

- d) If z = f(u, v), $u = log(x^2 + y^2)$, $v = \frac{y}{x}$ show that $x \frac{\partial z}{\partial y} y \frac{\partial z}{\partial x} = (1 + v^2) \frac{\partial z}{\partial v}$.
- e) Find the maximum value of $f = x^2 y^3 z^4$, subject to the condition x + y + z = 5.
- 6. Solve any three:

- a) If $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t$ sint, $z = e^t$ cost find $\frac{du}{dt}$ in terms of t.
- b) If $u=x^2-y^2$, v=2xy where $x=r\cos\theta$, $y=r\sin\theta$ find $\frac{\partial (u,v)}{\partial (r,\theta)}$.
- c) If f (x, y, z) = $x^3 y^2 z^4$ find approximate value of f when x = 1.99, y = 3.01, z = 0.99.
- d) Find the eigen values and eigen vector corresponding to largest eigen value

of the matrix
$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$
.

- e) If $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$, find eigen values of A and A^2 .
- 7. Solve **any two**:

10

a) If
$$u = Sin^{-1} \left[\frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{6}} + y^{\frac{1}{6}}} \right]$$
, find the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$.

- b) Examine whether the following vectors are linearly independent or dependent. If dependent find the relation between them [1, 0, 2, 1], [3, 1, 2, 1], [4, 6, 2, 4], [-6, 0, -3, 0].
- c) Find the extreme values of sinx + siny + sin (x + y).

SLR-EP – 1

Seat	
No.	

F.E. (Part – I) (New-CBCS) Examination, 2016 **ENGINEERING MATHEMATICS - I**

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

- 2) Figures to right indicate full marks.
- 3) **Use** of non-programmable calculator is allowed.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

1) If the characteristic equation of a matrix A is $\lambda^2 - 2\lambda + 1 = 0$ then

a)
$$A^{-1} = A - 2I$$

b)
$$A^{-1} = 2I - A$$

c)
$$A^{-1} = A^2 - 2A$$

- d) A^{-1} does not exist
- 2) The rank of the matrix $\begin{bmatrix} 2 & 2 & 2 \\ 1 & 1 & 1 \\ 3 & 3 & 3 \end{bmatrix}$ is
 - a) 1

- c) 3
- d) 0
- 3) Let A be 3×3 matrix of rank 3 then the solution of A X = 0 is
 - a) No solution

- b) One independent parameter
- c) Three independent parameter d) A trivial solution
- 4) If $z = \log (x \tan^{-1} y)$ then $\frac{\partial^2 z}{\partial x \partial y} = \underline{\hspace{1cm}}$
- a) $\frac{x}{1+y^2}$ b) $\frac{1}{x}$ c) $\frac{1}{x(1+v^2)}$
- d) 0
- 5) If $u = \frac{\sqrt{x^3 + y^3}}{x + y}$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \underline{\hspace{1cm}}$
- b) $\frac{u}{2}$ c) 0
- d) 2u



- 6) If u = x y, v = xy, then $\frac{\partial (u, v)}{\partial (x, y)} =$
 - a) x y
- b) y x
- c) 0
- d) x + y
- 7) The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to
 - a) 1%

- d) 0%

- 8) If $y = \sin^2 x$ then $y_n = ____$
 - a) $-2^{n-1} \cdot \cos(2x + n\pi/2)$
- b) $2^{n-1} \cdot \cos (2x n \frac{\pi}{2})$
- c) $2^{n-1} \cdot \sin(2x + n\pi/2)$
- d) $2^{n+1} \sin(2x n\pi/2)$
- 9) If $a + ib = \frac{1}{2 + 2i}$ then $a^2 + b^2 = \underline{\hspace{1cm}}$
 - a) 8
- b) $\frac{1}{8}$
- c) 4
- d) $\frac{1}{4}$
- 10) The principal value of log (i) = _____
 - a) 0
- b) $i\pi$
- c) 2πi
- d) $i \frac{\pi}{2}$

- 11) If $y = \frac{1}{(x+3)^3}$ then $y_n = \underline{\hspace{1cm}}$
- a) $\frac{(-1)^n \cdot (n+2)!}{(x+3)^{n+2}}$ b) $\frac{(-1)^n \cdot (n+1)!}{(x+3)^{n+3}}$ c) $\frac{(-1)^{n-1} \cdot (n+1)!}{(x+3)^{n+3}}$ d) $\frac{(-1)^n \cdot n!}{(x+3)^{n+1}} \cdot 3^n$
- 12) The first three terms in expansion of e^x · tanx are

 - a) $x + \frac{x^2}{2} + \frac{x^3}{3}$ b) $x + \frac{x^3}{3} + \frac{2}{5}x^5$ c) $x + x^2 + \frac{5}{6}x^3$ d) $x + \frac{x^3}{3} + \frac{x^5}{6}$

- 13) $Cosh(x + iy) = ____$
 - a) coshx · coshy + i sinhx · sinhy
- b) coshx · coshy isinhx · sinhy
- c) $\cosh x \cdot \cosh y i \sinh x \cdot \sin y$ d) $\cosh x \cdot \cos y + i \sinh x \cdot \sin y$
- 14) The value of $\lim_{x\to 0} \frac{x-\sin x}{y^3}$ is _____
 - a) $\frac{1}{6}$
- b) $-\frac{1}{6}$
- c) 0
- d) $\frac{1}{3}$



Seat No.

F.E. (Part – I) (New-CBCS) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

- 2) Figures to right indicate full marks.
- 3) **Use** of non-programmable calculator is allowed.

SECTION - I

2. Attempt any three of the following:

a) Find nth derivative of
$$\frac{x^2 + 4x + 1}{x^3 + 2x^2 - x - 2}$$
.

b) If $y = \sin^2 x \cdot \cos^3 x$ then find y_n .

c) Prove that
$$\sec^2 x = 1 + x^2 + \frac{2x^4}{3} + \dots$$

d) Expand f (x) = $x^5 - x^4 + x^3 - x^2 + x - 1$ in powers of (x – 1) and hence find F (0.99).

e) Simplify
$$\left(\frac{1}{\sqrt{2}} + i\frac{1}{\sqrt{2}}\right)^{4/3} + \left(\frac{1}{\sqrt{2}} - i\frac{1}{\sqrt{2}}\right)^{4/3}$$
.

3. Attempt any three of the following:

a) Evaluate
$$\lim_{x \to 1} (1 + \sec \pi x) \tan \left(\frac{\pi x}{2}\right)$$
.

b) Evaluate
$$\lim_{x \to 1} (1 - x^2)^{\frac{1}{\log(1 - x)}}$$
.

c) Solve
$$x^5 + 1 = 0$$
.



- d) Show that continued product of all values of $\left(\frac{1}{2} i \frac{\sqrt{3}}{2}\right)^{\frac{3}{4}}$ is 1.
- e) If $\sin (\theta + i\phi) = P(\cos \alpha + i \sin \alpha)$ then prove that $P^2 = \frac{1}{2}(\cosh 2\phi \cos 2\theta)$. 3
- 4. Attempt any two of the following:
 - a) If $y = (x + \sqrt{x^2 + a^2})^m$ then prove that $(x^2 + a^2) y_{n+2} + (2n + 1) xy_{n+1} + (n^2 m^2) y_n = 0 \text{ and hence prove that}$ $a^2 \cdot y_{n+2}(0) = (m^2 n^2)y_n(0).$ 5
 - b) Expand $\tan^{-1} \left(\frac{\sqrt{1 + x^2} 1}{x} \right)$ in powers of x.
 - c) If $\cos (x + iy) = \cos \alpha + i \sin \alpha$ then prove that :
 - i) $y = \frac{1}{2} \log \left[\frac{\sin(x \alpha)}{\sin(x + \alpha)} \right]$
 - ii) cos2x + cosh2y = 2.

SECTION - II

- 5. Solve any three:
 - a) Reduce the matrix A to its normal form when $A = \begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$ hence

find the rank of A.

- b) Test for consistency and solve the following systems of equations 2x y + 3z = 8, -x + 2y + z = 4, 3x + y 4z = 0.
- c) If $u = e^x$ (x cosy y siny) prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.

- d) If z = f(u, v), $u = log(x^2 + y^2)$, $v = \frac{y}{x}$ show that $x \frac{\partial z}{\partial y} y \frac{\partial z}{\partial x} = (1 + v^2) \frac{\partial z}{\partial v}$.
- e) Find the maximum value of $f = x^2 y^3 z^4$, subject to the condition x + y + z = 5.
- 6. Solve any three:

- a) If $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t$ sint, $z = e^t$ cost find $\frac{du}{dt}$ in terms of t.
- b) If $u=x^2-y^2$, v=2xy where $x=r\cos\theta$, $y=r\sin\theta$ find $\frac{\partial (u,v)}{\partial (r,\theta)}$.
- c) If f (x, y, z) = $x^3 y^2 z^4$ find approximate value of f when x = 1.99, y = 3.01, z = 0.99.
- d) Find the eigen values and eigen vector corresponding to largest eigen value

of the matrix
$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$
.

- e) If $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$, find eigen values of A and A^2 .
- 7. Solve **any two**:

10

a) If
$$u = Sin^{-1} \left[\frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{6}} + y^{\frac{1}{6}}} \right]$$
, find the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$.

- b) Examine whether the following vectors are linearly independent or dependent. If dependent find the relation between them [1, 0, 2, 1], [3, 1, 2, 1], [4, 6, 2, 4], [-6, 0, -3, 0].
- c) Find the extreme values of sinx + siny + sin (x + y).

|--|--|

SLR-EP – 1

Seat	
No.	

F.E. (Part - I) (New-CBCS) Examination, 2016 **ENGINEERING MATHEMATICS – I**

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

- 2) Figures to **right** indicate **full** marks.
- 3) **Use** of non-programmable calculator is allowed.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

1) The first three terms in expansion of e^x · tanx are

a)
$$x + \frac{x^2}{2} + \frac{x^3}{3}$$
 b) $x + \frac{x^3}{3} + \frac{2}{5}x^5$ c) $x + x^2 + \frac{5}{6}x^3$ d) $x + \frac{x^3}{3} + \frac{x^5}{6}$

- 2) Cosh $(x + iy) = ___$

 - a) coshx · coshy + isinhx · sinhy b) coshx · coshy isinhx · sinhy
 - c) $\cosh x \cdot \cosh y i \sinh x \cdot \sin y$ d) $\cosh x \cdot \cos y + i \sinh x \cdot \sin y$
- 3) The value of $\lim_{x\to 0} \frac{x-\sin x}{x^3}$ is _____

a)
$$\frac{1}{6}$$

a)
$$\frac{1}{6}$$
 b) $-\frac{1}{6}$ c) 0

d)
$$\frac{1}{3}$$

- 4) If the characteristic equation of a matrix A is $\lambda^2 2\lambda + 1 = 0$ then
 - a) $A^{-1} = A 2I$

b)
$$A^{-1} = 2I - A$$

c)
$$A^{-1} = A^2 - 2A$$

d)
$$A^{-1}$$
 does not exist

- 5) The rank of the matrix $\begin{bmatrix} 2 & 2 & 2 \\ 1 & 1 & 1 \\ 3 & 3 & 3 \end{bmatrix}$ is
 - a) 1
- b) 2
- c) 3
- d) 0



- 6) Let A be 3×3 matrix of rank 3 then the solution of A X = 0 is
 - a) No solution

- b) One independent parameter
- c) Three independent parameter
- d) A trivial solution
- 7) If $z = \log (x \tan^{-1} y)$ then $\frac{\partial^2 z}{\partial x \partial y} = \underline{\hspace{1cm}}$
- a) $\frac{x}{1+y^2}$ b) $\frac{1}{x}$ c) $\frac{1}{x(1+y^2)}$
- d) 0
- 8) If $u = \frac{\sqrt{x^3 + y^3}}{\sqrt{x^2 + y^3}}$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \underline{\hspace{1cm}}$
 - a) $\frac{3u}{2}$
- b) $\frac{u}{2}$
- c) 0
- d) 2u
- 9) If u = x y, v = xy, then $\frac{\partial (u, v)}{\partial (x, v)} =$
 - a) x y
- b) y x
- c) 0
- d) x + y
- 10) The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to
 - a) 1%
- b) 3%
- d) 0%

- 11) If $y = \sin^2 x$ then $y_n =$ _____
 - a) $-2^{n-1} \cdot \cos(2x + n\pi/2)$ b) $2^{n-1} \cdot \cos(2x n\pi/2)$
 - c) $2^{n-1} \cdot \sin \left(2x + n \frac{\pi}{2}\right)$
- d) $2^{n+1} \sin(2x n\pi/2)$
- 12) If $a + ib = \frac{1}{2 + 2i}$ then $a^2 + b^2 = \underline{\hspace{1cm}}$
 - a) 8
- b) $\frac{1}{8}$
- c) 4
- d) $\frac{1}{4}$
- 13) The principal value of log (i) = _____
 - a) 0
- b) $i\pi$
- c) 2πi
- d) $i^{\pi}/2$

- 14) If $y = \frac{1}{(x + 3)^3}$ then $y_n =$ _____
- a) $\frac{(-1)^n \cdot (n+2)!}{(x+3)^{n+2}}$ b) $\frac{(-1)^n \cdot (n+1)!}{(x+3)^{n+3}}$ c) $\frac{(-1)^{n-1} \cdot (n+1)!}{(x+3)^{n+3}}$ d) $\frac{(-1)^n \cdot n!}{(x+3)^{n+1}} \cdot 3^n$



Seat No.

F.E. (Part – I) (New-CBCS) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) All questions are compulsory.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

SECTION - I

2. Attempt any three of the following:

a) Find nth derivative of
$$\frac{x^2 + 4x + 1}{x^3 + 2x^2 - x - 2}$$
.

b) If $y = \sin^2 x \cdot \cos^3 x$ then find y_n .

c) Prove that
$$\sec^2 x = 1 + x^2 + \frac{2x^4}{3} + \dots$$

d) Expand f (x) = $x^5 - x^4 + x^3 - x^2 + x - 1$ in powers of (x – 1) and hence find F (0.99).

e) Simplify
$$\left(\frac{1}{\sqrt{2}} + i\frac{1}{\sqrt{2}}\right)^{4/3} + \left(\frac{1}{\sqrt{2}} - i\frac{1}{\sqrt{2}}\right)^{4/3}$$
.

3. Attempt any three of the following:

a) Evaluate
$$\lim_{x \to 1} (1 + \sec \pi x) \tan \left(\frac{\pi x}{2}\right)$$
.

b) Evaluate
$$\lim_{x \to 1} (1 - x^2)^{\frac{1}{\log(1 - x)}}$$
.

c) Solve
$$x^5 + 1 = 0$$
.



- d) Show that continued product of all values of $\left(\frac{1}{2} i \frac{\sqrt{3}}{2}\right)^{\frac{3}{4}}$ is 1.
- e) If $\sin (\theta + i\phi) = P(\cos \alpha + i \sin \alpha)$ then prove that $P^2 = \frac{1}{2}(\cosh 2\phi \cos 2\theta)$. 3
- 4. Attempt any two of the following:
 - a) If $y = (x + \sqrt{x^2 + a^2})^m$ then prove that $(x^2 + a^2) y_{n+2} + (2n + 1) xy_{n+1} + (n^2 m^2) y_n = 0 \text{ and hence prove that}$ $a^2 \cdot y_{n+2}(0) = (m^2 n^2)y_n(0).$ 5
 - b) Expand $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ in powers of x.
 - c) If $\cos (x + iy) = \cos \alpha + i \sin \alpha$ then prove that :
 - i) $y = \frac{1}{2} \log \left[\frac{\sin(x \alpha)}{\sin(x + \alpha)} \right]$
 - ii) cos2x + cosh2y = 2.

SECTION - II

- 5. Solve any three:
 - a) Reduce the matrix A to its normal form when $A = \begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$ hence

find the rank of A.

- b) Test for consistency and solve the following systems of equations 2x y + 3z = 8, -x + 2y + z = 4, 3x + y 4z = 0.
- c) If $u = e^x$ (x cosy y siny) prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.

- d) If z = f(u, v), $u = log(x^2 + y^2)$, $v = \frac{y}{x}$ show that $x \frac{\partial z}{\partial y} y \frac{\partial z}{\partial x} = (1 + v^2) \frac{\partial z}{\partial v}$.
- e) Find the maximum value of $f = x^2 y^3 z^4$, subject to the condition x + y + z = 5.
- 6. Solve any three:

- a) If $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t$ sint, $z = e^t$ cost find $\frac{du}{dt}$ in terms of t.
- b) If $u=x^2-y^2$, v=2xy where $x=r\cos\theta$, $y=r\sin\theta$ find $\frac{\partial (u,v)}{\partial (r,\theta)}$.
- c) If f (x, y, z) = $x^3 y^2 z^4$ find approximate value of f when x = 1.99, y = 3.01, z = 0.99.
- d) Find the eigen values and eigen vector corresponding to largest eigen value

of the matrix
$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$
.

- e) If $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$, find eigen values of A and A^2 .
- 7. Solve any two:

10

a) If
$$u = Sin^{-1} \left[\frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{6}} + y^{\frac{1}{6}}} \right]$$
, find the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$.

- b) Examine whether the following vectors are linearly independent or dependent. If dependent find the relation between them [1, 0, 2, 1], [3, 1, 2, 1], [4, 6, 2, 4], [-6, 0, -3, 0].
- c) Find the extreme values of sinx + siny + sin (x + y).

SLR-EP – 1

Seat	
No.	

F.E. (Part - I) (New-CBCS) Examination, 2016 **ENGINEERING MATHEMATICS – I**

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) **All** questions are **compulsory**.

- 2) Figures to **right** indicate **full** marks.
- 3) **Use** of non-programmable calculator is allowed.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

- 1) Let A be 3×3 matrix of rank 3 then the solution of A X = 0 is
 - a) No solution

- b) One independent parameter
- c) Three independent parameter d) A trivial solution

2) If
$$z = \log (x \tan^{-1} y)$$
 then $\frac{\partial^2 z}{\partial x \partial y} =$ _____

a)
$$\frac{x}{1 + y^2}$$

b)
$$\frac{1}{x}$$

a)
$$\frac{x}{1+y^2}$$
 b) $\frac{1}{x}$ c) $\frac{1}{x(1+y^2)}$

3) If
$$u = \frac{\sqrt{x^3 + y^3}}{x + y}$$
 then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \underline{\hspace{1cm}}$

a)
$$\frac{3u}{2}$$
 b) $\frac{u}{2}$ c) 0

b)
$$\frac{u}{2}$$

4) If
$$u = x - y$$
, $v = xy$, then $\frac{\partial (u, v)}{\partial (x, y)} =$ _____

- a) x y
- b) y x
- c) 0
- d) x + y
- 5) The percentage error in the area of a rectangle when an error of 1% is made in measuring its length and breadth is equal to ______
 - a) 1%
- b) 3%
- c) 2%
- d) 0%



- - c) $2^{n-1} \cdot \sin \left(2x + n\pi/2\right)$
- d) $2^{n+1} \sin(2x n\pi/2)$
- 7) If $a + ib = \frac{1}{2 + 2i}$ then $a^2 + b^2 = \underline{\hspace{1cm}}$
 - a) 8
- b) $\frac{1}{8}$
- c) 4
- 8) The principal value of log (i) = _____
 - a) 0

- b) $i\pi$
- c) 2πi

- 9) If $y = \frac{1}{(x+3)^3}$ then $y_n =$ _____
- a) $\frac{(-1)^n \cdot (n+2)!}{(x+3)^{n+2}}$ b) $\frac{(-1)^n \cdot (n+1)!}{(x+3)^{n+3}}$ c) $\frac{(-1)^{n-1} \cdot (n+1)!}{(x+3)^{n+3}}$ d) $\frac{(-1)^n \cdot n!}{(x+3)^{n+1}} \cdot 3^n$
- 10) The first three terms in expansion of e^x · tanx are _

 - a) $x + \frac{x^2}{2} + \frac{x^3}{3}$ b) $x + \frac{x^3}{3} + \frac{2}{5}x^5$ c) $x + x^2 + \frac{5}{6}x^3$ d) $x + \frac{x^3}{3} + \frac{x^5}{6}$

- 11) Cosh $(x + iy) = ____$

 - a) coshx · coshy + isinhx · sinhy b) coshx · coshy isinhx · sinhy
 - c) $\cosh x \cdot \cosh y i \sinh x \cdot \sin y$ d) $\cosh x \cdot \cos y + i \sinh x \cdot \sin y$
- 12) The value of $\lim_{x\to 0} \frac{x-\sin x}{x^3}$ is _____
- b) $-\frac{1}{6}$

- 13) If the characteristic equation of a matrix A is $\lambda^2 2\lambda + 1 = 0$ then

b) $A^{-1} = 2I - A$

a) $A^{-1} = A - 2I$ c) $A^{-1} = A^2 - 2A$

- d) A^{-1} does not exist
- 14) The rank of the matrix $\begin{vmatrix} 2 & 2 & 2 \\ 1 & 1 & 1 \\ 3 & 3 & 3 \end{vmatrix}$ is
 - a) 1

- b) 2
- c) 3
- d) 0



Seat No.

F.E. (Part – I) (New-CBCS) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.

- 2) Figures to right indicate full marks.
- 3) Use of non-programmable calculator is allowed.

SECTION - I

2. Attempt any three of the following:

a) Find nth derivative of
$$\frac{x^2 + 4x + 1}{x^3 + 2x^2 - x - 2}$$
.

b) If $y = \sin^2 x \cdot \cos^3 x$ then find y_n .

c) Prove that
$$\sec^2 x = 1 + x^2 + \frac{2x^4}{3} + \dots$$

d) Expand f (x) = $x^5 - x^4 + x^3 - x^2 + x - 1$ in powers of (x – 1) and hence find F (0.99).

e) Simplify
$$\left(\frac{1}{\sqrt{2}} + i\frac{1}{\sqrt{2}}\right)^{4/3} + \left(\frac{1}{\sqrt{2}} - i\frac{1}{\sqrt{2}}\right)^{4/3}$$
.

3. Attempt any three of the following:

a) Evaluate
$$\lim_{x \to 1} (1 + \sec \pi x) \tan \left(\frac{\pi x}{2}\right)$$
.

b) Evaluate
$$\lim_{x \to 1} (1 - x^2)^{\frac{1}{\log(1 - x)}}$$
.

c) Solve
$$x^5 + 1 = 0$$
.



- d) Show that continued product of all values of $\left(\frac{1}{2} i \frac{\sqrt{3}}{2}\right)^{\frac{3}{4}}$ is 1.
- e) If $\sin (\theta + i\phi) = P(\cos \alpha + i \sin \alpha)$ then prove that $P^2 = \frac{1}{2}(\cosh 2\phi \cos 2\theta)$. 3
- 4. Attempt any two of the following:
 - a) If $y = (x + \sqrt{x^2 + a^2})^m$ then prove that $(x^2 + a^2) y_{n+2} + (2n + 1) xy_{n+1} + (n^2 m^2) y_n = 0 \text{ and hence prove that}$ $a^2 \cdot y_{n+2}(0) = (m^2 n^2)y_n(0).$ 5
 - b) Expand $\tan^{-1}\left(\frac{\sqrt{1+x^2}-1}{x}\right)$ in powers of x.
 - c) If $\cos (x + iy) = \cos \alpha + i \sin \alpha$ then prove that :
 - i) $y = \frac{1}{2} \log \left[\frac{\sin(x \alpha)}{\sin(x + \alpha)} \right]$
 - ii) cos2x + cosh2y = 2.

SECTION - II

- 5. Solve any three:
 - a) Reduce the matrix A to its normal form when $A = \begin{bmatrix} 8 & 1 & 3 & 6 \\ 0 & 3 & 2 & 2 \\ -8 & -1 & -3 & 4 \end{bmatrix}$ hence

find the rank of A.

- b) Test for consistency and solve the following systems of equations 2x y + 3z = 8, -x + 2y + z = 4, 3x + y 4z = 0.
- c) If $u = e^x$ (x cosy y siny) prove that $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$.

- d) If z = f(u, v), $u = log(x^2 + y^2)$, $v = \frac{y}{x}$ show that $x \frac{\partial z}{\partial y} y \frac{\partial z}{\partial x} = (1 + v^2) \frac{\partial z}{\partial v}$.
- e) Find the maximum value of $f = x^2 y^3 z^4$, subject to the condition x + y + z = 5.
- 6. Solve any three:

- a) If $u = x^2 + y^2 + z^2$, $x = e^t$, $y = e^t$ sint, $z = e^t$ cost find $\frac{du}{dt}$ in terms of t.
- b) If $u=x^2-y^2$, v=2xy where $x=r\cos\theta$, $y=r\sin\theta$ find $\frac{\partial (u,v)}{\partial (r,\theta)}$.
- c) If f (x, y, z) = $x^3 y^2 z^4$ find approximate value of f when x = 1.99, y = 3.01, z = 0.99.
- d) Find the eigen values and eigen vector corresponding to largest eigen value

of the matrix
$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$
.

- e) If $A = \begin{bmatrix} 1 & 1 & 3 \\ 1 & 5 & 1 \\ 3 & 1 & 1 \end{bmatrix}$, find eigen values of A and A^2 .
- 7. Solve **any two**:

10

a) If
$$u = Sin^{-1} \left[\frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{6}} + y^{\frac{1}{6}}} \right]$$
, find the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$.

- b) Examine whether the following vectors are linearly independent or dependent. If dependent find the relation between them [1, 0, 2, 1], [3, 1, 2, 1], [4, 6, 2, 4], [-6, 0, -3, 0].
- c) Find the extreme values of sinx + siny + sin (x + y).

SLR-EP - 2

I Seat I		
Seat No.	0-4	D
140.	Set	P

F.E. (Part - I) (New - CBCS) Examination, 2016

	1 .E. (1 di	APPLIED MI		•	, 2010	
-	d Date : Wednesday 10.00 a.m. to 1.00 p				Tota	ıl Marks : 70
,	2) A D 3) U	D. No. 1 is compulse Answer Book Pag nswer MCQ/Object on't forget to men ise of non-program igures to the right	ge N ctivo ntion nma	o. 3. Each ques e type question n, Q.P. Set (P/Q ble scientific ca	stion carries I s on Page I I /R/S) on To l Ilculators is a	one mark. No. 3 only. o of Page.
Duratio	n : 30 Minutes	MCQ/Objective T	ype	Questions		Marks : 14
1. Ch	oose the correct an	swer:				(1×14=14)
1)	The process of find a) Composition of c) Idealization of for	forces	b)	of a force system Resolution of fo None of these		
2)	When a force is reare? a) Orthogonal com c) Reciprocal com	ponents	b)	y perpendicular Rectangular co None of these	-	ts, they
3)	The angle of inclinato move down the parameters a) Angle of friction c) Angle of repose	olane is called	b)	ch the body rest Angle of project None of these		e begins
4)	A beam, 10 m long, at its two ends. Wh a) 8 KN		at ea	ach support?	KN/m and su	pported
5)	The M.I. of a rectar passing through its a) bh ³ /12	_		(b) and height of bh ³ /36	(h) about an d) bh ³ /3	axis
6)	The moment of a for the area of the trian is the point about w	ngle, whose base is	s lin	e representing t	=	d vertex

a) Half b) Same c) Twice d) None of above

7)	A framed structure is imperfect, if to $(2j-3)$, where 'j' is number of joints a) Equal to c) Greater than		mbers are
8)	The position of a particle which move $x = t^3 - 6t^2 - 15t + 40$. Find the time a a) 0 b) 5 sec		
9)	A particle is dropped from a height ha air resistance, the velocity with which	_	
	a) 2gh b) $\sqrt{2gh}$	c) $\sqrt{2gh^2}$	d) $2\sqrt{gh}$
10)	A stone just released from the windo straight track. The stone will hit the gr a) Straight line c) Hyperbolic path	· · · · · · · · · · · · · · · · · · ·	
11)	•	oil of gun is b) Newton's seco d) None of these	and law of motion
12)	When a elevator of weight W moving the tension in the cable supported the a) $T = m(g + a)$ c) $T = mg$	•	
13)	During elastic impact, the relative vel the relative velocity of th	e two bodies befor	e impact.
	a) Equal toc) Less than	b) Equal and oppd) Greater than	osite to
14)	The work done on a body is zero wher a) There is no displacement of the bo b) Resultant of forces acting on it is a c) The displacement is perpendicula d) All of above	ody zero	force

Marks: 56



Seat	
No.	

F.E. (Part – I) (New – CBCS) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Use of non-programmable scientific calculators is allowed.

2) Figures to the **right** indicate **full** marks.

SECTION-I

2. Solve any four:

a) State the laws of friction.
b) Explain various types of supports for beams.
c) State the assumptions made in the analysis of perfect frame.
d) State and prove 'Law of Parallelogram of forces', for calculating the resultant force.
e) Forces acting along sides and at apices of an equilateral triangle of side 5 m are as shown in figure (1). A clockwise moment of 150 N-m acts about point C. Determine only the magnitude of the resultant of the force system.

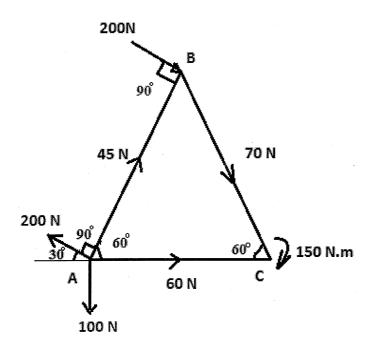
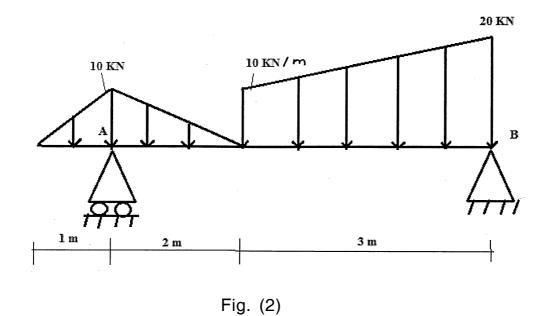


Fig. (1)



Set P

f) Find the reaction at support B only, for the beam, loaded as shown in figure (2). 3



g) Locate centroid of the shaded area of a plane lamina, as shown in figure (3).

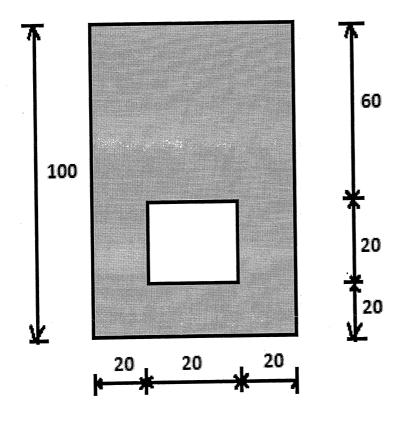


Fig. (3)

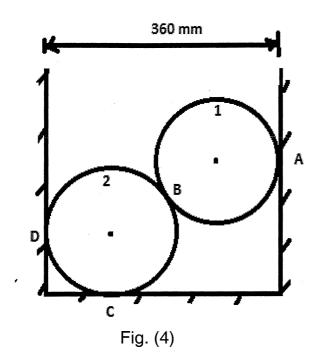


3. Solve any two questions of the following:

 $(8 \times 2 = 16)$

a) Two cylinders of 200 mm diameter each and weight 100 N each, rest in a horizontal channel having vertical walls. The distance between the walls is 360 mm. Find the reactions at the points of contact A, B, C and D as shown in Figure 4. Assume all surfaces to be smooth.

8



b) Determine the forces in members AB, BC, BD, BE, DE of the truss as shown in Fig. (5).

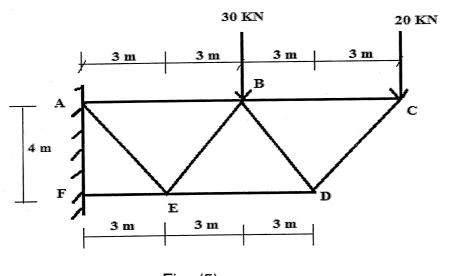
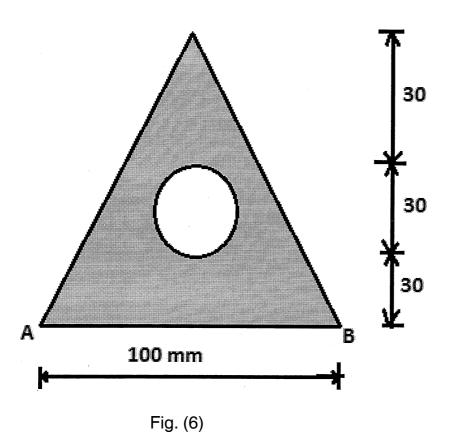


Fig. (5)

c) Locate the centroid of shaded area shown in figure (6). Determine the M.I. of the shaded area about the centroidal X-X axis only. Also find M.I. of the shaded area about the base A-B. All dimensions are in 'mm'.

8



SECTION - II

4. Solve any four of the following:

 $(4 \times 3 = 12)$

3 3

3

3

a) A particle, starting from rest moves in a straight line, whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 5 seconds.

b) Derive x-t, v-t and a-t relationships for uniformly accelerated motion.

c) A car of 2 ton mass moving at speed 54 kmph is to be brought to halt in a distance of 40 m. What should be the braking force applied assuming it to be uniform?

d) What do you understand by 'Super-elevation'? Discuss necessity of providing super elevation on railways.



- e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find the average torque exerted on it, if the radius of gyration of the flywheel is 60 cm.
- f) State and prove the 'Work Energy Principle'.

3

8

8

5. Solve any two of the following:

 $(8 \times 2 = 16)$

- a) A ball is thrown from top of a building of 20 m height with a velocity of 30 m/sec at an upward angle 45 degrees to the horizontal. Determine the velocity of ball at t = 2 seconds. How high the ball will rise above the ground? Determine the horizontal distance it will travel before striking the ground. Also, determine the velocity and direction of ball at the instant of striking the ground.
- b) Two rough planes inclined at 30° and 15° to the horizontal and of the same height, are placed back to back. Two bodies of masses 15 kg and 5 kg are placed on the faces and connected by a string over top of planes and frictionless pulley. Assuming coefficient of friction to be 0.3, find the resulting acceleration of the system (Refer Fig. 7).

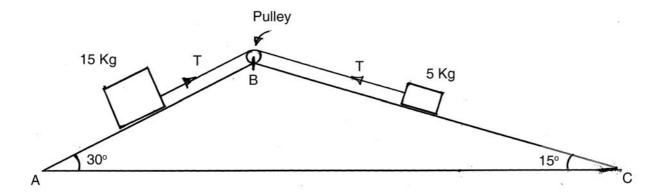


Fig. (7) with question 5(b)

c) A truck of mass 6 ton moving at 60 kmph collides with a car of 2 ton mass moving at 45 kmph in the same direction as that of truck. If after the collision, they join and move together as one body, determine their common velocity. Determine the loss in kinetic energy, considering the two vehicles to be single system.

a) Equal to

c) Less than

				SLR-EP – 2
Seat No.				Set Q
	F.E.	(Part – I) (New – APPLIED	CBCS) Examina MECHANICS	ation, 2016
•	d Date : Wedne 10.00 a.m. to 1	esday, 14-12-2016 .00 p.m.		Total Marks : 70
	Instructions :	in Answer Book I 2) Answer MCQ/O I Don't forget to n	Page No. 3. Each q bjective type ques nention, Q.P. Set (rammable scientifi	e solved in first 30 minutes question carries one mark. tions on Page No. 3 only. P/Q/R/S) on Top of Page. c calculators is allowed. arks.
Duratio	on : 30 Minutes		e Type Questions	Marks : 14
1. Ch	oose the corre	ect answer :		(1×14=14)
	$x = t^3 - 6t^2 - a$ a) 0 A particle is d	15t + 40. Find the tir b) 5 sec	ne at which velocit c) 10 sec th above the grour	d) 15 sec nd. Assuming negligible
	a) 2gh	b) $\sqrt{2gh}$	c) $\sqrt{2gh^2}$	d) $2\sqrt{gh}$
3)	-	. The stone will hit the ne		ath
4)	a) Newton's	otion involved in the first law of motion third law of motion	b) Newton's s	
5)		the cable supported	• .	•
6)	During elastic	impact, the relative	velocity of two boo	dies after impacts is

the relative velocity of the two bodies before impact.

b) Equal and opposite to

d) Greater than

SLR-EP - 2

-2-



7)	The work done on a body is zero when, a) There is no displacement of the body b) Resultant of forces acting on it is zero				
	c) The displacement is perpendiculad) All of above	r to the direction of t	force		
8)	The process of finding out the resultation of forces c) Idealization of forces	ant of a force system is called b) Resolution of forces d) None of these			
9)	When a force is resolved in two mutare?	ually perpendicular	components, they		
	a) Orthogonal componentsc) Reciprocal components	b) Rectangular cod) None of these	mponents		
10)	The angle of inclination of the plane at to move down the plane is called a) Angle of friction c) Angle of repose	which the body resting on plane beginsb) Angle of projectiond) None of these			
11)	A beam, 10 m long, carries uniformly d at its two ends. What is the reaction a a) 8 KN b) 80 KN		(N/m and supported d) 4 KN		
12)	The M.I. of a rectangular section of bar passing through its base is given by a) bh ³ /12 b) bh ³ /24	ase (b) and height (c) bh ³ /36	h) about an axis d) bh ³ /3		
13)	The moment of a force about any point the area of the triangle, whose base is is the point about which the moment it a) Half b) Same	s line representing t			
14)	A framed structure is imperfect, if to $(2j-3)$, where 'j' is number of joints a) Equal to c) Greater than		mbers are		

Marks: 56



Seat	
No.	

F.E. (Part – I) (New – CBCS) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Use of non-programmable scientific calculators is allowed.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Solve any four:

a) State the laws of friction.
b) Explain various types of supports for beams.
c) State the assumptions made in the analysis of perfect frame.
d) State and prove 'Law of Parallelogram of forces', for calculating the resultant force.
e) Forces acting along sides and at apices of an equilateral triangle of side 5 m are as shown in figure (1). A clockwise moment of 150 N-m acts about point C. Determine only the magnitude of the resultant of the force system.

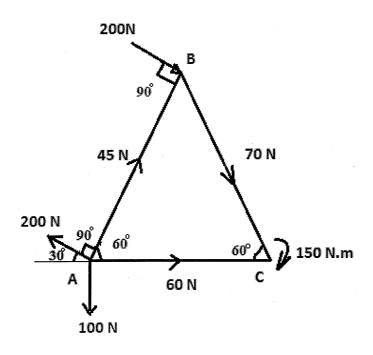
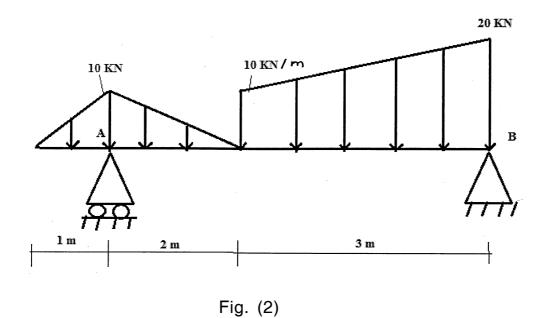


Fig. (1) Set Q



f) Find the reaction at support B only, for the beam, loaded as shown in figure (2). 3



g) Locate centroid of the shaded area of a plane lamina, as shown in figure (3). 3

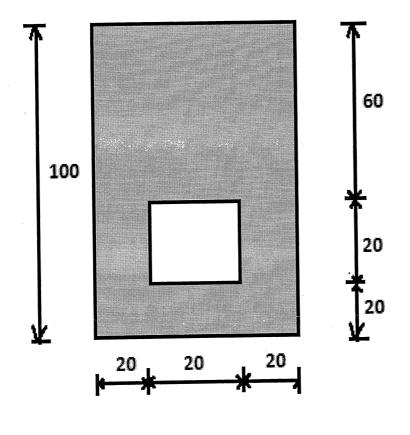


Fig. (3)

Set Q



3. Solve any two questions of the following:

 $(8 \times 2 = 16)$

8

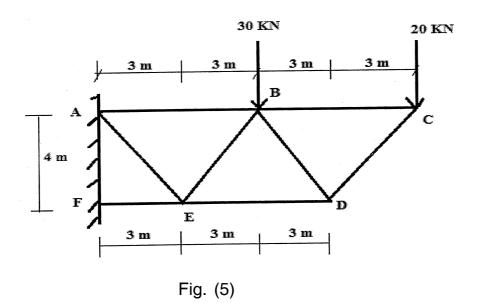
8

a) Two cylinders of 200 mm diameter each and weight 100 N each, rest in a horizontal channel having vertical walls. The distance between the walls is 360 mm. Find the reactions at the points of contact A, B, C and D as shown in Figure 4. Assume all surfaces to be smooth.

360 mm

2
B
C
Fig. (4)

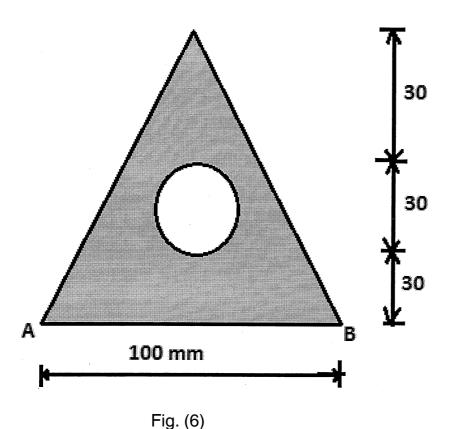
b) Determine the forces in members AB, BC, BD, BE, DE of the truss as shown in Fig. (5).



Set Q

c) Locate the centroid of shaded area shown in figure (6). Determine the M.I. of the shaded area about the centroidal X-X axis only. Also find M.I. of the shaded area about the base A-B. All dimensions are in 'mm'.





SECTION - II

4. Solve any four of the following:

 $(4 \times 3 = 12)$

3 3

3

3

a) A particle, starting from rest moves in a straight line, whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 5 seconds.

b) Derive x-t, v-t and a-t relationships for uniformly accelerated motion.

c) A car of 2 ton mass moving at speed 54 kmph is to be brought to halt in a distance of 40 m. What should be the braking force applied assuming it to be uniform?

d) What do you understand by 'Super-elevation'? Discuss necessity of providing super elevation on railways.



- e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find the average torque exerted on it, if the radius of gyration of the flywheel is 60 cm.
- f) State and prove the 'Work Energy Principle'.

3

8

8

5. Solve any two of the following:

 $(8 \times 2 = 16)$

- a) A ball is thrown from top of a building of 20 m height with a velocity of 30 m/sec at an upward angle 45 degrees to the horizontal. Determine the velocity of ball at t = 2 seconds. How high the ball will rise above the ground? Determine the horizontal distance it will travel before striking the ground. Also, determine the velocity and direction of ball at the instant of striking the ground.
- b) Two rough planes inclined at 30° and 15° to the horizontal and of the same height, are placed back to back. Two bodies of masses 15 kg and 5 kg are placed on the faces and connected by a string over top of planes and frictionless pulley. Assuming coefficient of friction to be 0.3, find the resulting acceleration of the system (Refer Fig. 7).

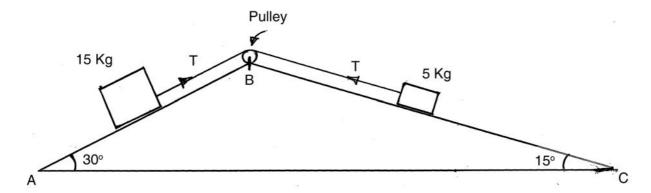


Fig. (7) with question 5(b)

c) A truck of mass 6 ton moving at 60 kmph collides with a car of 2 ton mass moving at 45 kmph in the same direction as that of truck. If after the collision, they join and move together as one body, determine their common velocity. Determine the loss in kinetic energy, considering the two vehicles to be single system.

|--|--|

							SLI	K-EP – 2
Sea No								Set R
		F.E.	-	l) (New – (APPLIED) Examinat HANICS	ion, 2016	
•		d Date : Wedne 10.00 a.m. to 1	•	-12-2016			Tot	al Marks : 70
		Instructions :	in Answ 2) Answ Don 't 3) Use o	swer Book F v er MCQ/O k t forget to n of non-progr	Page N pjectiv e nentioi ramma	o. 3. Each que type questi n, Q.P. Set (P.	iestion carries i ons on Page / Q/R/S) on To calculators is	one mark. No. 3 only. Op of Page.
Dura	atio	n : 30 Minutes	МС	Q/Objectiv	е Туре	Questions		Marks: 14
1.	Ch	oose the corre	ct answe	r:				(1×14=14)
	1)	The M.I. of a passing through bh ³ /12	gh its ba		ЭУ		ht (h) about a d) bh ³ /3	n axis
	2)	The moment of the area of the is the point about the second control of the second contro	e triangle out whic	, whose bas h the mome	e is lin nt is ta	e representin	ng the force ar	nd vertex
	3)	 a) Half A framed str (2 j - 3), when a) Equal to c) Greater that 	ucture is e 'j' is nu	-	if the nts of a b)	number of r	nembers are	
	4)	The position $x = t^3 - 6t^2 - a$	15t + 40.	Find the tin	ne at w			
	5)	A particle is d air resistance		_		•	_	egligible
		a) 2gh	b)	$\sqrt{2gh}$	c)	$\sqrt{2gh^2}$	d) $2\sqrt{gh}$	
	6)	A stone just r straight track. a) Straight lin c) Hyperbolic	The stor		grour b)		th	orizontal



7)	The law of motion involved in the reco	o lic	f aun is		
-,	a) Newton's first law of motionc) Newton's third law of motion	b)	Newton's secon	nd la	aw of motion
8)	When a elevator of weight W moving the tension in the cable supported the	e lift	is	ı ac	celeration, then
	a) $T = m(g + a)$ c) $T = mg$	•	T = m(g - a) None of the abo	ve	
9)	During elastic impact, the relative vel the relative velocity of th				
	a) Equal toc) Less than	,	Equal and oppo Greater than	site	e to
10)	The work done on a body is zero where a) There is no displacement of the body is zero where a) There is no displacement of the body is zero where a) Resultant of forces acting on it is zero. The displacement is perpendiculated at the control of the body is zero where a property is zero where a zero where a property is zero where a zero where	dy zero)	forc	e
11)	The process of finding out the resultaa) Composition of forcesc) Idealization of forces	b)	of a force systen Resolution of fo None of these		
12)	When a force is resolved in two muti are?	uall	y perpendicular	cor	mponents, they
	a) Orthogonal componentsc) Reciprocal components	,	Rectangular con None of these	mpc	onents
13)	The angle of inclination of the plane at to move down the plane is called	whi	ch the body rest	ing	on plane begins
	a) Angle of frictionc) Angle of repose	,	Angle of project None of these	ion	
14)	A beam, 10 m long, carries uniformly diat its two ends. What is the reaction at a) 8 KN b) 80 KN	ıt ea			n and supported 4 KN
	, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2, 2,	- /		- /	

Marks: 56

Set R



Seat	
No.	

F.E. (Part – I) (New – CBCS) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Use of non-programmable scientific calculators is allowed.

2) Figures to the **right** indicate **full** marks.

SECTION-I

2. Solve any four:

a) State the laws of friction.
b) Explain various types of supports for beams.
c) State the assumptions made in the analysis of perfect frame.
d) State and prove 'Law of Parallelogram of forces', for calculating the resultant force.
e) Forces acting along sides and at apices of an equilateral triangle of side 5 m are as shown in figure (1). A clockwise moment of 150 N-m acts about point C. Determine only the magnitude of the resultant of the force system.

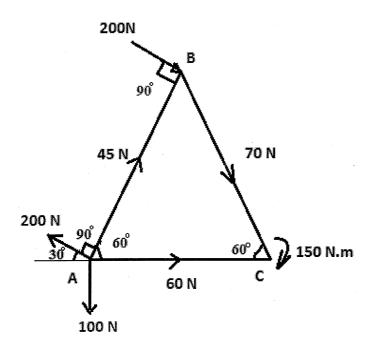
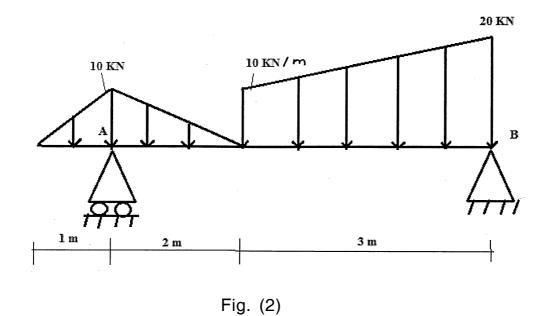


Fig. (1)

Set R

f) Find the reaction at support B only, for the beam, loaded as shown in figure (2). 3



g) Locate centroid of the shaded area of a plane lamina, as shown in figure (3).

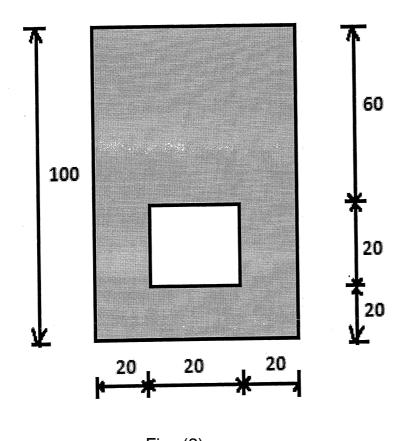


Fig. (3)

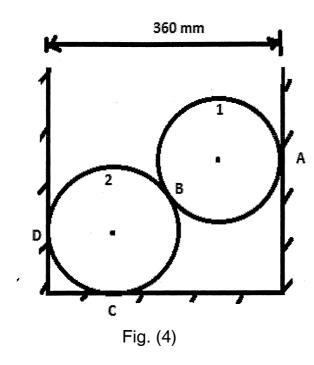


3. Solve any two questions of the following:

 $(8 \times 2 = 16)$

a) Two cylinders of 200 mm diameter each and weight 100 N each, rest in a horizontal channel having vertical walls. The distance between the walls is 360 mm. Find the reactions at the points of contact A, B, C and D as shown in Figure 4. Assume all surfaces to be smooth.

8



b) Determine the forces in members AB, BC, BD, BE, DE of the truss as shown in Fig. (5).

8

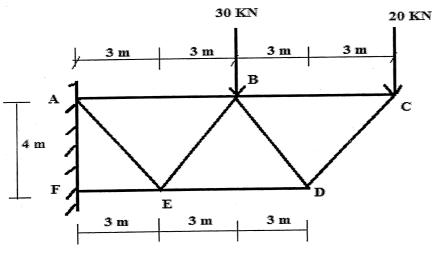
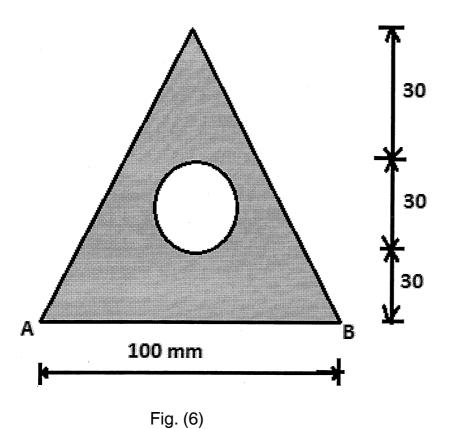


Fig. (5)

-6-

c) Locate the centroid of shaded area shown in figure (6). Determine the M.I. of the shaded area about the centroidal X-X axis only. Also find M.I. of the shaded area about the base A-B. All dimensions are in 'mm'.





SECTION - II

4. Solve any four of the following:

 $(4 \times 3 = 12)$

3 3

3

3

a) A particle, starting from rest moves in a straight line, whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 5 seconds.

b) Derive x-t, v-t and a-t relationships for uniformly accelerated motion.

c) A car of 2 ton mass moving at speed 54 kmph is to be brought to halt in a distance of 40 m. What should be the braking force applied assuming it to be uniform?

d) What do you understand by 'Super-elevation'? Discuss necessity of providing super elevation on railways.

Set R



- e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find the average torque exerted on it, if the radius of gyration of the flywheel is 60 cm.
- f) State and prove the 'Work Energy Principle'.

3

8

8

5. Solve any two of the following:

 $(8 \times 2 = 16)$

- a) A ball is thrown from top of a building of 20 m height with a velocity of 30 m/sec at an upward angle 45 degrees to the horizontal. Determine the velocity of ball at t = 2 seconds. How high the ball will rise above the ground? Determine the horizontal distance it will travel before striking the ground. Also, determine the velocity and direction of ball at the instant of striking the ground.
- b) Two rough planes inclined at 30° and 15° to the horizontal and of the same height, are placed back to back. Two bodies of masses 15 kg and 5 kg are placed on the faces and connected by a string over top of planes and frictionless pulley. Assuming coefficient of friction to be 0.3, find the resulting acceleration of the system (Refer Fig. 7).

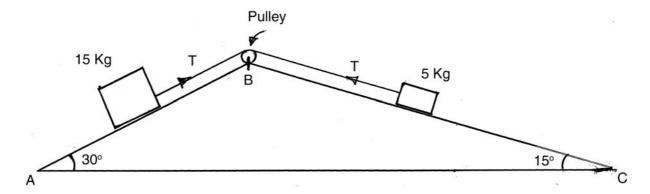


Fig. (7) with question 5(b)

c) A truck of mass 6 ton moving at 60 kmph collides with a car of 2 ton mass moving at 45 kmph in the same direction as that of truck. If after the collision, they join and move together as one body, determine their common velocity. Determine the loss in kinetic energy, considering the two vehicles to be single system.

d) All of above

SLR-EP - 2

Soot		
Seat		
No.	Set	S

` ' '	- CBCS) Examination, 2016 D MECHANICS
Day and Date : Wednesday, 14-12-2016 Time : 10.00 a.m. to 1.00 p.m.	Total Marks : 70
in Answer Book 2) Answer MCQ/C Don't forget to 3) Use of non-prog	pulsory. It should be solved in first 30 minutes a Page No. 3. Each question carries one mark. Objective type questions on Page No. 3 only. mention, Q.P. Set (P/Q/R/S) on Top of Page. grammable scientific calculators is allowed. right indicate full marks.
MCQ/Objecti Duration : 30 Minutes	ive Type Questions Marks: 14
1. Choose the correct answer:	(1×14=14)
straight track. The stone will hit the a) Straight line c) Hyperbolic path 2) The law of motion involved in the	b) Parabolic path d) Circular path e recoil of gun is b) Newton's second law of motion
,	ving upward with uniform acceleration, then
,	re velocity of two bodies after impacts is r of the two bodies before impact. b) Equal and opposite to d) Greater than
 5) The work done on a body is zero a) There is no displacement of the b) Resultant of forces acting on c) The displacement is perpending 	he body it is zero



6)	The process of finding a) Composition of for c) Idealization of force	ces	b)	of a force system Resolution of fo None of these		
7)	When a force is reso are?	lved in two mutu	ıall	y perpendicular	cor	mponents, they
	a) Orthogonal compoc) Reciprocal compo		,	Rectangular cor None of these	npc	onents
8)	The angle of inclinatio to move down the pla	•		•		on plane begins
	a) Angle of frictionc) Angle of repose			Angle of project None of these	ion	
9)	A beam, 10 m long, ca at its two ends. What	is the reaction a	t ea	ach support ?		• •
	a) 8 KN b)	80 KN	c)	40 KN	d)	4 KN
10)	The M.I. of a rectangupassing through its ba	ase is given by				
	a) bh ³ /12 b)) bh ³ /24	c)	bh ³ /36	d)	bh ³ /3
11)	The moment of a force the area of the triangle is the point about which	e, whose base is	lin	e representing th	•	
	a) Half b)	Same	c)	Twice	d)	None of above
12)	A framed structure is $(2j-3)$, where 'j' is n a) Equal to c) Greater than	•	of a b)		nbe	ers are
13)	The position of a part $x = t^3 - 6t^2 - 15t + 40$. Find the time a	at w	hich velocity is	zer	o ?
4.4	,) 5 sec	•		,	15 sec
14)	A particle is dropped f air resistance, the vel	-		-		
	a) 2gh b)	$\sqrt{2gh}$	c)	$\sqrt{2gh^2}$	d)	$2\sqrt{gh}$

Marks: 56

Set S



Seat	
No.	

F.E. (Part – I) (New – CBCS) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Use of non-programmable scientific calculators is allowed.

2) Figures to the **right** indicate **full** marks.

SECTION-I

2. Solve any four:

a) State the laws of friction.
b) Explain various types of supports for beams.
c) State the assumptions made in the analysis of perfect frame.
d) State and prove 'Law of Parallelogram of forces', for calculating the resultant force.
e) Forces acting along sides and at apices of an equilateral triangle of side 5 m are as shown in figure (1). A clockwise moment of 150 N-m acts about point C. Determine only the magnitude of the resultant of the force system.

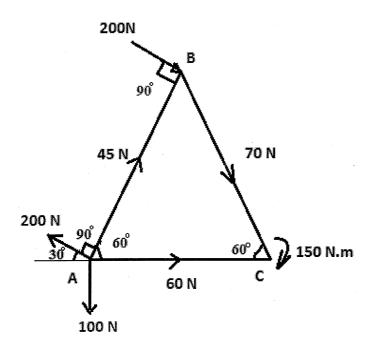


Fig. (1)

f) Find the reaction at support B only, for the beam, loaded as shown in figure (2). 3

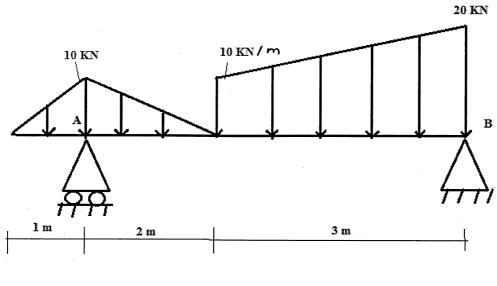


Fig. (2)

g) Locate centroid of the shaded area of a plane lamina, as shown in figure (3). 3

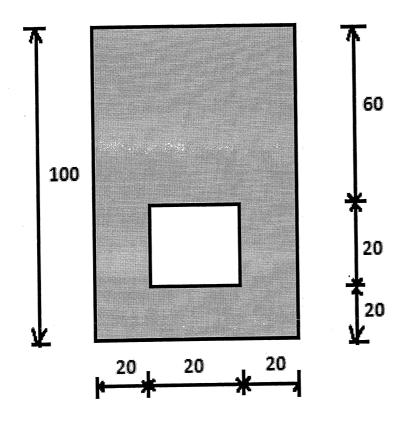


Fig. (3)

Set S

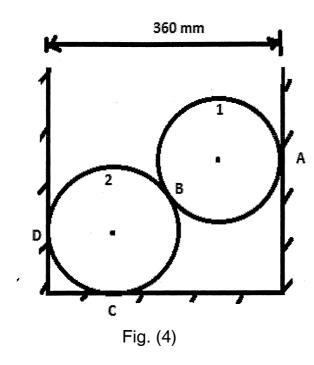


3. Solve any two questions of the following:

 $(8 \times 2 = 16)$

a) Two cylinders of 200 mm diameter each and weight 100 N each, rest in a horizontal channel having vertical walls. The distance between the walls is 360 mm. Find the reactions at the points of contact A, B, C and D as shown in Figure 4. Assume all surfaces to be smooth.

8



b) Determine the forces in members AB, BC, BD, BE, DE of the truss as shown in Fig. (5).

8

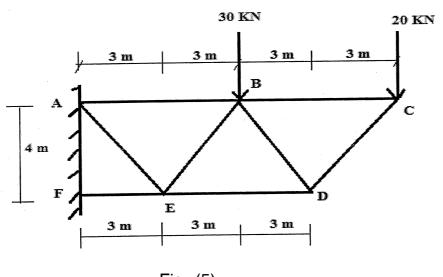
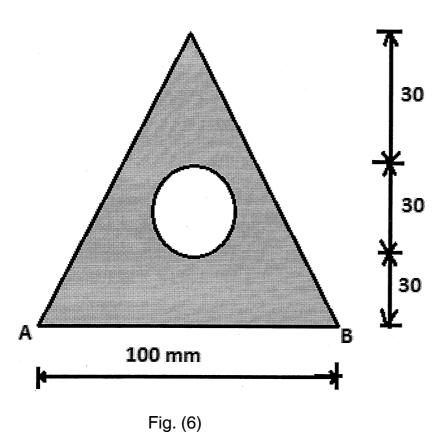


Fig. (5)

c) Locate the centroid of shaded area shown in figure (6). Determine the M.I. of the shaded area about the centroidal X-X axis only. Also find M.I. of the shaded area about the base A-B. All dimensions are in 'mm'.

8



SECTION - II

4. Solve any four of the following:

 $(4 \times 3 = 12)$

a) A particle, starting from rest moves in a straight line, whose equation of motion is given by $s = t^3 - 2t^2 + 3$. Find the velocity and acceleration of the particle after 5 seconds.

3

b) Derive x-t, v-t and a-t relationships for uniformly accelerated motion.

3

3

c) A car of 2 ton mass moving at speed 54 kmph is to be brought to halt in a distance of 40 m. What should be the braking force applied assuming it to be uniform?

3

d) What do you understand by 'Super-elevation'? Discuss necessity of providing super elevation on railways.

Set S



- e) A flywheel of mass 8 tonnes starts from rest and gets up a speed of 180 rpm in 3 minutes. Find the average torque exerted on it, if the radius of gyration of the flywheel is 60 cm.
- f) State and prove the 'Work Energy Principle'.

3

8

8

5. Solve **any two** of the following:

 $(8 \times 2 = 16)$

- a) A ball is thrown from top of a building of 20 m height with a velocity of 30 m/sec at an upward angle 45 degrees to the horizontal. Determine the velocity of ball at t = 2 seconds. How high the ball will rise above the ground? Determine the horizontal distance it will travel before striking the ground. Also, determine the velocity and direction of ball at the instant of striking the ground.
- b) Two rough planes inclined at 30° and 15° to the horizontal and of the same height, are placed back to back. Two bodies of masses 15 kg and 5 kg are placed on the faces and connected by a string over top of planes and frictionless pulley. Assuming coefficient of friction to be 0.3, find the resulting acceleration of the system (Refer Fig. 7).

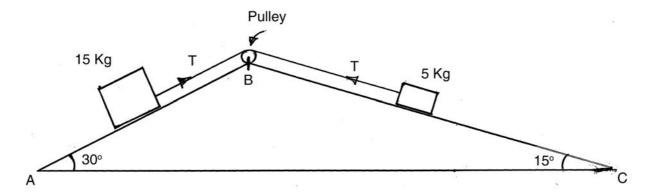


Fig. (7) with question 5(b)

c) A truck of mass 6 ton moving at 60 kmph collides with a car of 2 ton mass moving at 45 kmph in the same direction as that of truck. If after the collision, they join and move together as one body, determine their common velocity. Determine the loss in kinetic energy, considering the two vehicles to be single system.

SLR-EP – 3

Seat	
No.	

F.E. (Part – I) (New CBCS) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

- 2) **Assume** suitable data **whenever** necessary.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) A 3 phase supply system is symmetrical if all the three phases have the equal
 - a) Current
- b) Voltages
- c) Impedance
- d) Power factor
- 2) The impedance of purely capacitive circuit is given by
 - a) $z = R jX_C$
- b) $z = + jX_C$
- c) $z = -jX_C$
- d) $z = X_C + jR$
- 3) The real part of an admittance Y = 0.1 + j 0.2 is
 - a) Resistance

b) Conductance

c) Inductance

- d) None of the above
- 4) In single phase steps up transformer
 - a) $N_1 < N_2$
- b) $N_2 < N_1$ c) $V_2 < V_1$
- d) $l_1 < l_2$
- 5) For R-L-C series circuit if $X_{L} = X_{C}$ then the expression for the power is, Apparent Power =
 - a) P + iQ
- b) P iQ
- c) P
- d) Q

- 6) Energy of 1000 Wh is equivalent to
 - a) One unit of energy consumption
 - b) Thousand unit of energy consumption
 - c) 36×10^6 Joules
 - d) None of the above



7)	The positive peak value a) 60°	/alue of sinusoidal b) 45°		current is occur 30°	rring at an angle d) 90°	
8)	A phasors are the a) Vectors rotating the clockwise direction b) Vectors rotating in anti clockwise direction c) Non rotating vectors d) None of these					
9)	Thethat is a) flux	nrough all the parts b) reluctance		_	etic circuit is same. d) current	
10)	Hysteresis loop is a a) Flux and Relucta c) Flux and Absolu	ance	,	MMF and Reluc	ctance	
11)	The best suitable man a) Silicon steel c) Silicon steel she	-	b)	onstruction of tr Hard steel Hard steel shee		
12)	In DC shunt motor a) Armature and field winding are connected in series b) Armature and field winding are connected in parallel c) They are not connected d) None of the above					
13)	Find value of resist resistances	ance in delta conn	ecti	on from star cor	nnected three 2Ω	
	a) 2Ω	b) 4Ω	c)	6 Ω	d) 8Ω	
14)	a) 2Ω b) 4Ω c) 6Ω d) 8Ω In case of Kirchoff's current law following statement is correct a) Algebraic sum of current meeting at node is zero b) In-coming current is equal to outgoing current c) Both a) and b) d) None of the above					

-3- SLR-EP – 3

Seat	
No.	

F.E. (Part – I) (New CBCS) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

2) Assume suitable data whenever necessary.

SECTION - I

2. Solve any four:

 $(4 \times 4 = 16)$

a) Find current flowing though 30 Ω resistance.

- b) Define and derive expression for RMS value of sinusoidal alternating quantity.
- c) Explain the term magnetic leakage and fringing write their effect on magnetic circuit.
- d) A 60 Hz sinusoidal alternating current has peak of 14.14 A. Its zero crossing entering the +ve half cycle occurs at t=0.
 - i) Write down the time equation for current
 - ii) Calculate R.M.S. and average value
 - iii) Determine the time taken to reach a value of $-\,10\,\mathrm{A}$ for the 1^{st} time in the cycle.
- e) An electric kettle is required to heat 6 liters of water from 17°C to 98°C in 25 minutes. Find the rating of kettle assuming the efficiency of 83%. If the kettle is to be operated on 230 V mains, find the resistance of heating element assume specific heat capacity of water to be 4200 J/Kg-K and 1 liter of water to have a mass of 1 kg.
- f) Explain the concept dynamically induced emf and give one example of electrical device working on this principal.

- 3. Solve:
 - a) Explain with suitable sketches and waveforms the principles of generation of sinusoidal voltage.

OR

- b) A cast steel electromagnet has air gap of 2 mm length and iron path of length 30 cm. Determine the current in the coil required to produce a flux density of 0.8(T) in the air gap. The relative permeability of cast steel at the given flux density is 800 and the number of turns in the coil is 500.
- c) Explain the effect of temperature on conductors and derive the relation

 $\alpha_1 = \frac{\alpha_0}{1 + \alpha_0}$

SECTION - II

4. Solve any four:

 $(4 \times 4 = 16)$

6

6

- a) Draw a impedance triangle and waveform of R-L ckt. comment on the power factor of circuit.
- b) A 200 KVA, 3300 V/240 V, 50 Hz single phase transformer has 80 turns on secondary winding. Calculate (a) the primary and secondary current on full load, (b) the max value of the flux and (c) the number of primary turns.
- c) Draw neat diagram of dc shunt motor and explain armature current versus speed characteristic.
- d) A delta connected load draw a current of 15 A at a lagging power factor of 0.85 from a 400 V, 3 phase, 50 Hz supply.

Calculate:

- i) Resistance and inductance of each phase
- ii) Power consumed.
- e) Define the following with respect to single phase transformer.
 - i) Voltage regulation ii) KVA rating iii) Current ratio iv) Efficiency
- f) A coil having resistance of 6 ohms and inductance of 0.03 H is connected across a 50 V, 60 Hz supply. Calculate (i) Current (ii) Phase angle between current and applied vtg (iii) power factor.

5. Solve any two:

 $(2 \times 6 = 12)$

- a) Derive the relationship between phase current and line current in case of balanced delta connected load. Draw phaser diagram.
- b) A resistance of 12 ohms, an inductance of 0.15 H and a capacitance of 100 μF are connected in series across a 100 V, 50 Hz single phase a.c. supply. Calculate: (i) Current (ii) The voltage across inductance (iii) The voltage across the capacitance and (iv) The power factor of the ckt. Draw also the phasor diagram for the ckt.
- c) In a single phase 20 KVA 2000/200 V, 50 Hz, the iron and copper losses are 300 W and 350 W respectively. Calculate the efficiency at 0.8 p.f. lagging for (i) full load condition and (ii) 20% overload condition.

Seat	Set	
No.	Set	3

F.E. (Part – I) (New CBCS) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date : Friday, 16-12-2016 Max

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

- 2) Assume suitable data whenever necessary.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

1. Choose the correct answer:	(14×1=14)

1) A phasors are the

Duration: 30 Minutes

- a) Vectors rotating the clockwise direction
- b) Vectors rotating in anti clockwise direction
- c) Non rotating vectors
- d) None of these
- 2) The _____ through all the parts of the series magnetic circuit is same.a) fluxb) reluctancec) mmfd) current
- 3) Hysteresis loop is a graph between
 - a) Flux and Reluctance
- b) MMF and Reluctance
- c) Flux and Absolute permeability
- d) None of above
- 4) The best suitable magnetic material for construction of transformer core is
 - a) Silicon steel

- b) Hard steel
- c) Silicon steel sheet laminations
- d) Hard steel sheet laminations

- 5) In DC shunt motor
 - a) Armature and field winding are connected in series
 - b) Armature and field winding are connected in parallel
 - c) They are not connected
 - d) None of the above

Marks: 14

6) Find value of resistance in delta connection from star connected three 2 $\!\Omega$

	resistances			
	a) 2Ω	b) 4Ω	c) 6Ω	d) 8Ω
7)	In case of Kirchoff's a) Algebraic sum of b) In-coming curre c) Both a) and b) d) None of the abo	of current meeting of the street of the stre	at node is zero	orrect
8)	A 3 phase supply equal	system is symme	trical if all the thre	e phases have the
	a) Current	b) Voltages	c) Impedance	d) Power factor
9)	The impedance of	purely capacitive o	circuit is given by	
	a) $z = R - jX_C$	b) $z = + jX_C$	c) $z = -jX_C$	d) $z = X_C + jR$
10)	The real part of an a) Resistance c) Inductance	admittance Y = 0.	1 + j 0.2 is b) Conductance d) None of the abo	ove
11)	In single phase ste	ps up transformer		
	a) $N_1 < N_2$	b) $N_2 < N_1$	c) $V_2 < V_1$	d) $I_1 < I_2$
12)	For R-L-C series contained Apparent Power =	ircuit if $X_L = X_C$ the	en the expression fo	or the power is,
	a) P + jQ	b) P – jQ	c) P	d) Q
13)	Energy of 1000 Wha) One unit of enerb) Thousand unit of c) 36×10^6 Joules d) None of the about	gy consumption of energy consump	tion	
14)	The positive peak	alue of sinusoidal	AC current is occu	rring at an angle
	a) 60°	b) 45°	c) 30°	d) 90°
				



Seat	
No.	

F.E. (Part – I) (New CBCS) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

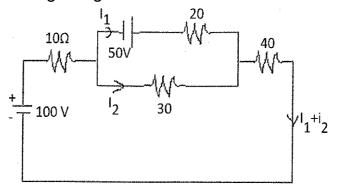
2) Assume suitable data whenever necessary.

SECTION-I

2. Solve any four:

 $(4 \times 4 = 16)$

a) Find current flowing though 30 Ω resistance.



- b) Define and derive expression for RMS value of sinusoidal alternating quantity.
- c) Explain the term magnetic leakage and fringing write their effect on magnetic circuit.
- d) A 60 Hz sinusoidal alternating current has peak of 14.14 A. Its zero crossing entering the +ve half cycle occurs at t=0.
 - i) Write down the time equation for current
 - ii) Calculate R.M.S. and average value
 - iii) Determine the time taken to reach a value of -10 A for the 1st time in the cycle.
- e) An electric kettle is required to heat 6 liters of water from 17°C to 98°C in 25 minutes. Find the rating of kettle assuming the efficiency of 83%. If the kettle is to be operated on 230 V mains, find the resistance of heating element assume specific heat capacity of water to be 4200 J/Kg-K and 1 liter of water to have a mass of 1 kg.
- f) Explain the concept dynamically induced emf and give one example of electrical device working on this principal.
 Set Q

3. Solve:

a) Explain with suitable sketches and waveforms the principles of generation of sinusoidal voltage.

6

6

OR

- b) A cast steel electromagnet has air gap of 2 mm length and iron path of length 30 cm. Determine the current in the coil required to produce a flux density of 0.8(T) in the air gap. The relative permeability of cast steel at the given flux density is 800 and the number of turns in the coil is 500.
- c) Explain the effect of temperature on conductors and derive the relation

$$\alpha_{t} = \frac{\alpha_{0}}{1 + t\alpha_{0}}.$$

SECTION - II

4. Solve any four: (4×4=16)

- a) Draw a impedance triangle and waveform of R-L ckt. comment on the power factor of circuit.
- b) A 200 KVA, 3300 V/240 V, 50 Hz single phase transformer has 80 turns on secondary winding. Calculate (a) the primary and secondary current on full load, (b) the max value of the flux and (c) the number of primary turns.
- c) Draw neat diagram of dc shunt motor and explain armature current versus speed characteristic.
- d) A delta connected load draw a current of 15 A at a lagging power factor of 0.85 from a 400 V, 3 phase, 50 Hz supply.
 Calculate:
 - i) Resistance and inductance of each phase
 - ii) Power consumed.
- e) Define the following with respect to single phase transformer.
 - i) Voltage regulation ii) KVA rating iii) Current ratio iv) Efficiency
- f) A coil having resistance of 6 ohms and inductance of 0.03 H is connected across a 50 V, 60 Hz supply. Calculate (i) Current (ii) Phase angle between current and applied vtg (iii) power factor.

5. Solve any two: (2×6=12)

- a) Derive the relationship between phase current and line current in case of balanced delta connected load. Draw phaser diagram.
- b) A resistance of 12 ohms, an inductance of 0.15 H and a capacitance of $100\,\mu\text{F}$ are connected in series across a $100\,\text{V}$, $50\,\text{Hz}$ single phase a.c. supply. Calculate : (i) Current (ii) The voltage across inductance (iii) The voltage across the capacitance and (iv) The power factor of the ckt. Draw also the phasor diagram for the ckt.
- c) In a single phase 20 KVA 2000/200 V, 50 Hz, the iron and copper losses are 300 W and 350 W respectively. Calculate the efficiency at 0.8 p.f. lagging for (i) full load condition and (ii) 20% overload condition.

_____ Set Q

\$\text{SLR-EP} - 3

Seat	Set F	
No.	Jet F	

		F.E	•	– I) (New (C ELECTR		•	nination, 2016 NEERING	5
•		l Date : Frida 0.00 a.m. to	-					Max. Marks: 70
	<i>II</i>	nstructions	2) As 3) Q. in A	No. 1 is comp Answer Book I swer MCQ/O	le data oulsor Page Objecti	whene y. It shou No. 3. Ea ve type	full marks. ver necessary. uld be solved in fach question ca questions on P Set (P/Q/R/S) o	arries one mark. P age No. 3 only.
				MCQ/Objectiv	ve Typ	e Ques	tions	
Dura	tior	n : 30 Minute	S					Marks : 14
1. (Cho	ose the corr	ect ans	wer:				(14×1=14)
		Apparent Po	wer =	cuit if $X_L = X_C$ b) $P - jQ$			ression for the d	power is,
		a) One unit	of energ d unit of Joules	is equivalent i gy consumptic energy consu e	on	n		
	-	The positive a) 60°	-	alue of sinusc b) 45°		C currei 30°	nt is occurring a d) 90	_
	•	•	otating otating ting vec	the clockwise in anti clockw tors				
	•	The a) flux		rough all the p b) reluctance		f the ser a) mmf	ries magnetic ci d) cu	
		α_j max		s, islasianos	, .	,	a, cc	4110116



6)	a) Flux and Aback	ance	,	MMF and Reluc	tance	е
7)	c) Flux and AbsoluThe best suitable na) Silicon steel		or c	None of above construction of tr Hard steel	ansfo	ormer core is
	c) Silicon steel she	eet laminations	,	Hard steel shee	t lam	inations
8)	In DC shunt motor a) Armature and fid b) Armature and fid c) They are not cod d) None of the abo	eld winding are cor nnected				
9)	Find value of resist resistances	ance in delta conn	ect	ion from star cor	nect	ed three 2Ω
	a) 2Ω	b) 4Ω	c)	6 Ω	d) 8	Ω
10)	In case of Kirchoff' a) Algebraic sum of b) In-coming curre c) Both a) and b) d) None of the abo	of current meeting ent is equal to outgo	at n	ode is zero	orrec	t
11)	A 3 phase supply equal	system is symme	tric	al if all the three	pha	ses have the
	a) Current	b) Voltages	c)	Impedance	d) F	ower factor
12)	The impedance of a) $z = R - jX_C$			-	d) z	= X _C + jR
13)	The real part of an a) Resistance c) Inductance	•	1 + b)	•		Ü
14)	In single phase ste a) N ₁ < N ₂		c)	V ₂ < V ₁	d) I.	₁ < l ₂



Seat	
No.	

F.E. (Part – I) (New CBCS) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

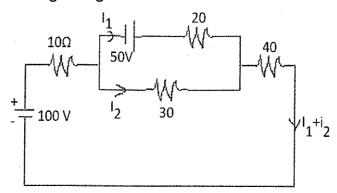
2) Assume suitable data whenever necessary.

SECTION-I

2. Solve any four:

 $(4 \times 4 = 16)$

a) Find current flowing though 30 Ω resistance.



- b) Define and derive expression for RMS value of sinusoidal alternating quantity.
- c) Explain the term magnetic leakage and fringing write their effect on magnetic circuit.
- d) A 60 Hz sinusoidal alternating current has peak of 14.14 A. Its zero crossing entering the +ve half cycle occurs at t=0.
 - i) Write down the time equation for current
 - ii) Calculate R.M.S. and average value
 - iii) Determine the time taken to reach a value of $-10\,\mathrm{A}$ for the 1st time in the cycle.
- e) An electric kettle is required to heat 6 liters of water from 17°C to 98°C in 25 minutes. Find the rating of kettle assuming the efficiency of 83%. If the kettle is to be operated on 230 V mains, find the resistance of heating element assume specific heat capacity of water to be 4200 J/Kg-K and 1 liter of water to have a mass of 1 kg.
- f) Explain the concept dynamically induced emf and give one example of electrical device working on this principal.
 Set R



3. Solve:

a) Explain with suitable sketches and waveforms the principles of generation of sinusoidal voltage.

6

OR

- b) A cast steel electromagnet has air gap of 2 mm length and iron path of length 30 cm. Determine the current in the coil required to produce a flux density of 0.8(T) in the air gap. The relative permeability of cast steel at the given flux density is 800 and the number of turns in the coil is 500.
- c) Explain the effect of temperature on conductors and derive the relation

 $\alpha_t = \frac{\alpha_0}{1 + t\alpha_0}.$

6

SECTION - II

4. Solve any four:

 $(4 \times 4 = 16)$

- a) Draw a impedance triangle and waveform of R-L ckt. comment on the power factor of circuit.
- b) A 200 KVA, 3300 V/240 V, 50 Hz single phase transformer has 80 turns on secondary winding. Calculate (a) the primary and secondary current on full load, (b) the max value of the flux and (c) the number of primary turns.
- c) Draw neat diagram of dc shunt motor and explain armature current versus speed characteristic.
- d) A delta connected load draw a current of 15 A at a lagging power factor of 0.85 from a 400 V, 3 phase, 50 Hz supply.

Calculate:

- i) Resistance and inductance of each phase
- ii) Power consumed.
- e) Define the following with respect to single phase transformer.
 - i) Voltage regulation ii) KVA rating iii) Current ratio iv) Efficiency
- f) A coil having resistance of 6 ohms and inductance of 0.03 H is connected across a 50 V, 60 Hz supply. Calculate (i) Current (ii) Phase angle between current and applied vtg (iii) power factor.

Solve any two :

 $(2 \times 6 = 12)$

- a) Derive the relationship between phase current and line current in case of balanced delta connected load. Draw phaser diagram.
- b) A resistance of 12 ohms, an inductance of 0.15 H and a capacitance of $100\,\mu\text{F}$ are connected in series across a 100 V, 50 Hz single phase a.c. supply. Calculate : (i) Current (ii) The voltage across inductance (iii) The voltage across the capacitance and (iv) The power factor of the ckt. Draw also the phasor diagram for the ckt.
- c) In a single phase 20 KVA 2000/200 V, 50 Hz, the iron and copper losses are 300 W and 350 W respectively. Calculate the efficiency at 0.8 p.f. lagging for (i) full load condition and (ii) 20% overload condition.

Seat	Set	
No.	OCI	3

F.E. (Part – I) (New CBCS) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

- 2) Assume suitable data whenever necessary.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes	Marks: 14
1. Choose the correct answer:	(14×1=14)

- 1) Hysteresis loop is a graph between
 - a) Flux and Reluctance
- b) MMF and Reluctance
- c) Flux and Absolute permeability
- d) None of above
- 2) The best suitable magnetic material for construction of transformer core is
 - a) Silicon steel

- b) Hard steel
- c) Silicon steel sheet laminations
- d) Hard steel sheet laminations

- 3) In DC shunt motor
 - a) Armature and field winding are connected in series
 - b) Armature and field winding are connected in parallel
 - c) They are not connected
 - d) None of the above
- 4) Find value of resistance in delta connection from star connected three 2 Ω resistances
 - a) 2Ω
- b) 4Ω
- c) 6Ω
- d) 8Ω
- 5) In case of Kirchoff's current law following statement is correct
 - a) Algebraic sum of current meeting at node is zero
 - b) In-coming current is equal to outgoing current
 - c) Both a) and b)
 - d) None of the above



6)	A 3 phase supply equal	system is symme	trical if all the three	e phases have the
	a) Current	b) Voltages	c) Impedance	d) Power factor
7)	The impedance of	purely capacitive o	circuit is given by	
	a) $z = R - jX_C$	b) $z = + jX_C$	c) $z = -jX_C$	d) $z = X_C + jR$
8)	The real part of an	admittance $Y = 0$.	•	
	a) Resistance		b) Conductance	
- \	c) Inductance		d) None of the abo	ove
9)	In single phase ste	•	a)	ما ا
40)	-		c) V ₂ < V ₁	· -
10)	For R-L-C series c Apparent Power =	ircuit if $X_L = X_C$ the	en the expression to	or the power is,
	a) P + jQ	b) P – jQ	c) P	d) Q
11)	Energy of 1000 Wha) One unit of energy of 1000 Wha) Thousand unit of c) 36×10^6 Joules d) None of the about	rgy consumption of energy consump	tion	
12)	The positive peak			-
	a) 60°	b) 45°	c) 30°	d) 90°
13)	A phasors are the			
	a) Vectors rotating			
	b) Vectors rotatingc) Non rotating vec		uirection	
	d) None of these	3.3.3		
14)	Theth	nrough all the parts	of the series magn	etic circuit is same.
	a) flux	b) reluctance	c) mmf	d) current
			 	



Seat	
No.	

F.E. (Part – I) (New CBCS) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Figures to the **right** indicates **full** marks.

2) Assume suitable data whenever necessary.

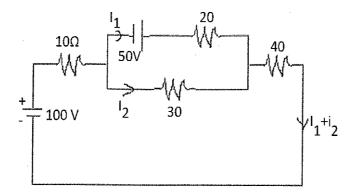
SECTION-I

2. Solve any four:

 $(4 \times 4 = 16)$

Marks: 56

a) Find current flowing though 30 Ω resistance.



- b) Define and derive expression for RMS value of sinusoidal alternating quantity.
- c) Explain the term magnetic leakage and fringing write their effect on magnetic circuit.
- d) A 60 Hz sinusoidal alternating current has peak of 14.14 A. Its zero crossing entering the +ve half cycle occurs at t = 0.
 - i) Write down the time equation for current
 - ii) Calculate R.M.S. and average value
 - iii) Determine the time taken to reach a value of $-10\,\mathrm{A}$ for the 1^st time in the cycle.
- e) An electric kettle is required to heat 6 liters of water from 17°C to 98°C in 25 minutes. Find the rating of kettle assuming the efficiency of 83%. If the kettle is to be operated on 230 V mains, find the resistance of heating element assume specific heat capacity of water to be 4200 J/Kg-K and 1 liter of water to have a mass of 1 kg.
- f) Explain the concept dynamically induced emf and give one example of electrical device working on this principal.



3. Solve:

a) Explain with suitable sketches and waveforms the principles of generation of sinusoidal voltage.

6

6

OR

- b) A cast steel electromagnet has air gap of 2 mm length and iron path of length 30 cm. Determine the current in the coil required to produce a flux density of 0.8(T) in the air gap. The relative permeability of cast steel at the given flux density is 800 and the number of turns in the coil is 500.
- c) Explain the effect of temperature on conductors and derive the relation

$$\alpha_{t} = \frac{\alpha_{0}}{1 + t\alpha_{0}}.$$

SECTION - II

4. Solve any four:

 $(4 \times 4 = 16)$

- a) Draw a impedance triangle and waveform of R-L ckt. comment on the power factor of circuit.
- b) A 200 KVA, 3300 V/240 V, 50 Hz single phase transformer has 80 turns on secondary winding. Calculate (a) the primary and secondary current on full load, (b) the max value of the flux and (c) the number of primary turns.
- c) Draw neat diagram of dc shunt motor and explain armature current versus speed characteristic.
- d) A delta connected load draw a current of 15 A at a lagging power factor of 0.85 from a 400 V, 3 phase, 50 Hz supply.
 Calculate:
 - i) Resistance and inductance of each phase
 - ii) Power consumed.
- e) Define the following with respect to single phase transformer.
 - i) Voltage regulation ii) KVA rating iii) Current ratio iv) Efficiency
- f) A coil having resistance of 6 ohms and inductance of 0.03 H is connected across a 50 V, 60 Hz supply. Calculate (i) Current (ii) Phase angle between current and applied vtg (iii) power factor.

5. Solve **any two**:

 $(2 \times 6 = 12)$

- a) Derive the relationship between phase current and line current in case of balanced delta connected load. Draw phaser diagram.
- b) A resistance of 12 ohms, an inductance of 0.15 H and a capacitance of $100\,\mu\text{F}$ are connected in series across a 100 V, 50 Hz single phase a.c. supply. Calculate : (i) Current (ii) The voltage across inductance (iii) The voltage across the capacitance and (iv) The power factor of the ckt. Draw also the phasor diagram for the ckt.
- c) In a single phase 20 KVA 2000/200 V, 50 Hz, the iron and copper losses are 300 W and 350 W respectively. Calculate the efficiency at 0.8 p.f. lagging for (i) full load condition and (ii) 20% overload condition.

	0-4.0
	Set 9

Seat No.	t $lacksquare$	P
----------	----------------	---

-	→			
F	.E. (Part – I) (New) (BASIC MECHAI	CBCS) Examinati NICAL ENGINEER	-	
Day and Date: Monda Time: 10.00 a.m. to 1.	• •		Total Mark	(s : 70
Instructions :	 3) Q. 3 and Q. 5 are 4) Figures to the rig 5) Assume suitable 6) Q. No. 1 is comp Answer Book Pa 7) Answer MCQ/O 	e short answer type e long answer type oght indicate full mark data if necessary abulsory. It should be age No. 3. Each questive type ques	uestions.	esin nly.
Duration : 30 Minutes	MCQ/Object	ive Type Questions	Mark	ks : 14
Choose the corre	ct answer:			14
	following is not a prop	erty of the system?		17
a) Temperati	•	c) Heat	d) Volume	
2) Second law o	of thermodynamics de	fines		
a) Enthalpy	b) Entropy	c) Heat	d) Work	
	expansion ratio, work to work done in case		case of adiabatic proces	S
a) Same	to work done in case	b) More	55 15	
c) Less		d) None of the	e above	
·	I process is governed	=		
a) Charle's la		b) Boyle's law		
c) Joules lav	v and high discharge v	d) Gay-Lussa	Claw	
a) Centrifuga	•	b) Reciprocat	ng pumps	
c) Vane pum	• •	d) None		
6) The flow of w	ater at entry of Kapla			
a) Radial	b) Tangentia	l c) Axial	d) None	
 7) To reduce exc a) Track rash 	•	ater in the pipeline to c) Surge Tanl	turbine the device used it discount to the device used it disc	is

8)	Thermal efficiency of a four stroke cycle engine is	e er	ngine as compare to two stroke cycle	
	a) More	b)	Less	
	c) Same	d)	None of the above	
9)	Otto cycle is also called as			
	a) Constant pressure cycle	b)	Constant volume cycle	
	c) Constant temperature cycle	d)	None	
10)	For maximum power transmission centri	ifug	al tension in the belt	
	a) Tc = Tmax	b)	Tc = T1 + T2	
	c) Tc = Tmax/3	d)	Tc = Tmax - T1	
11)) If for power transmission, a simple gear train consisting of 8 gears is used, ther the motion of the driver and follower will be in the			
	a) Same direction	b)	Opposite direction	
	c) Both a) and b)	d)	None of the above	
12)	Man, machine and working environment a product in	rela	tionship is considered while designing	
	a) Ergonomic consideration	b)	Thermodynamics	
	c) Air conditioning	d)	Aesthetic consideration	
13)	Sustainable design consist of			
	a) Use of recycled material			
	b) Less consumption of natural resource	es		
	c) Eco-friendly design			
	d) All of above			
14)	Which of the following welding process	req	uires external pressure ?	
	a) Electric arc welding	b)	Oxyacetylene gas welding	
	c) Spot welding	d)	None	
	-			



Seat	
No.	

F.E. (Part – I) (New) (CBCS) Examination, 2016 **BASIC MECHANICAL ENGINEERING**

Marks: 56 Day and Date: Monday, 19-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. 2 and Q. 4 are short answer type questions. 3) Q. 3 and Q. 5 are long answer type questions.
- 4) Figures to the **right** indicate **full** marks.
- 5) Assume suitable data if necessary and mention them clearly.

SECTION - I

2. Solve any five out of seven:

 $(5 \times 3 = 15)$

- a) State and explain second law of thermodynamics.
- b) A cycle consists of four processes; the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kW)	W (kW)	Δ U (kW)
1 – 2	40	_	25
2 – 3	20	-10	_
3 – 4	-20	_	_
4 – 1	0	8	_

- c) Explain with neat sketch Window air conditioner.
- d) Derive relation between Cp, Cv, R and γ .
- e) Explain with neat sketch Roots Blower.
- f) Compare impulse and reaction turbine.
- g) Differentiate between BWR and PWR.
- 3. Solve any one out of (a) and (b) and solve any two out of (c) to (f):

13 a) In a steady flow machine 405 kW of work is done by the machine. The flow rate of

- fluid is 3 kg/sec. The Sp. Volume of the fluid, pressure and velocity at the inlet are 0.45 m³/kg, 10 bar and 20 m/sec. The inlet is 36 m above the floor and discharge is at the floor level. The discharge conditions are 0.8 m³/kg, 3 bar and 320 m/sec respectively. The total heat loss between inlet and discharge is 12 kJ/kg of the fluid. Find the change in Sp. internal energy.
- b) Explain with neat sketch working of Hydro-electric power plant. State its advantage and disadvantages.

Set P

5

4.

5.



c)	1 kg of air at 10 bar and $0.15~\text{m}^3$ volume is expanded to volume of $0.75~\text{m}^3$. Determine the final temperature, work done and heat transfer during the process, if the expansion is at constant pressure. Take R = $0.287~\text{kJ/kgk}$, Cv = $0.7~\text{kJ/kgk}$ for air.	4
d)	Explain Single Acting Reciprocating Pump with neat sketch.	4
e)		4
f)		4
	SECTION - II	
So	olve any five out of seven : (5×3=	15)
	Write the difference between SI and CI Engine.	- ,
b)	In an air standard Otto cycle pressure ratio during the compression is 18. The temperature of air at beginning of compression is 27°C. Maximum temperature attained in a cycle is 2200°C. Determine thermal efficiency of cycle and work done. Compare belt drive with chain drive.	
,	Explain types of gear train with neat sketch.	
•	Write a note on sustainable design.	
,	Explain different modes of failure while designing a machine component.	
,	Explain different operations in Lathe Machine.	
So	olve any one out of (a) and (b) and solve any two out of (c) to (f):	13
	Two pulley one 600 mm diameter and other 400 mm diameter are on parallel shaft are 4 meter apart are connected by cross belt drive. Find length of belt required and angle of contact between belt and pulley. What power can be transmitted when larger pulley rotates at 450 rpm, if maximum permissible tension is 3 kN and coefficient of friction between belt and pulley is 0.3?	5
b)	Draw block diagram of Pillar Drilling Machine. Explain function of basic elements.	5
c)	An air standard diesel cycle has compression ratio of 18 and the heat addition	
	referred to working fluid per cycle 1800 kJ/kg. At the beginning of compression	4
۱۱ء	stroke the pressure is 1 bar and the temperature is 27°C. Find Thermal efficiency.	4
•	Explain stepwise design procedure while designing of any mechanical component	. 4
e)	Explain with neat sketch brazing process. State its advantages, limitations and applications.	4
f)	State advantages and limitations of gas welding.	4
٠,		-



SLR-EP - 4

Seat	
No.	

F.E. (Part - I) (New) (CBCS) Examination, 2016 **BASIC MECHANICAL ENGINEERING**

Day and Date : Monday, 19-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. 2 and Q. 4 are short answer type questions.
- 3) Q. 3 and Q. 5 are long answer type questions.
- 4) Figures to the **right** indicate **full** marks.
- 5) Assume suitable data if necessary and mention them clearly.
- 6) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 7) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Obj	jective Type Questions
Duration : 30 Minutes	Marks : 14
1. Choose the correct answer:	14
 Thermal efficiency of a four strength engine is 	roke cycle engine as compare to two stroke cycle
a) More	b) Less
c) Same	d) None of the above
2) Otto cycle is also called as	
 a) Constant pressure cycle 	b) Constant volume cycle
c) Constant temperature cycle	d) None

3) For maximum power transmission centrifugal tension in the belt

a) Tc = Tmax

b) Tc = T1 + T2

c) Tc = Tmax/3

d) Tc = Tmax - T1

4) If for power transmission, a simple gear train consisting of 8 gears is used, then the motion of the driver and follower will be in the

a) Same direction

b) Opposite direction

c) Both a) and b)

d) None of the above



5)) Man, machine and working environment relationship is considered while designing a product in				
	a) Ergonomic consideration	b) Thermodynamic	es		
	c) Air conditioning	d) Aesthetic consid	deration		
6)	Sustainable design consist of				
	a) Use of recycled material				
	b) Less consumption of natural resource	es			
	c) Eco-friendly design				
	d) All of above				
7)	Which of the following welding process	requires external pre	essure?		
	a) Electric arc welding	b) Oxyacetylene ga	as welding		
	c) Spot welding	d) None			
8)	Which of the following is not a property of		N 14 1		
۵,	a) Temperature b) Pressure	c) Heat	d) Volume		
9)	Second law of thermodynamics defines a) Enthalpy b) Entropy	c) Heat	d) Work		
10\	, , , , , , , , , , , , , , , , , , , ,	,	,		
10)	 For the same expansion ratio, work done by the gas in case of adiabatic process as compared to work done in case of isothermal process is 				
	a) Same	b) More			
	c) Less	d) None of the abo	ve		
11)	An isothermal process is governed by				
	a) Charle's law	b) Boyle's lawd) Gay-Lussac law			
10\	c) Joules law	,			
12)	For low head and high discharge which a) Centrifugal pump	b) Reciprocating p	umns		
	c) Vane pumps	d) None			
13)	The flow of water at entry of Kaplan Turk	bine is			
	a) Radial b) Tangential	c) Axial	d) None		
14)	To reduce excessive pressure of water in	the pipeline to turbir	ne the device used is		
	a) Track rash b) Valve	c) Surge Tank	d) Breaking jet		



Seat	
No.	

F.E. (Part – I) (New) (CBCS) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

2) Q. 2 and Q. 4 are short answer type questions.3) Q. 3 and Q. 5 are long answer type questions.

4) Figures to the **right** indicate **full** marks.

5) Assume suitable data **if necessary** and mention them **clearly**.

SECTION - I

2. Solve any five out of seven:

 $(5 \times 3 = 15)$

- a) State and explain second law of thermodynamics.
- b) A cycle consists of four processes; the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kW)	W (kW)	Δ U (kW)
1 – 2	40	-	25
2 – 3	20	-10	I
3 – 4	-20		1
4 – 1	0	8	_

- c) Explain with neat sketch Window air conditioner.
- d) Derive relation between Cp, Cv, R and γ .
- e) Explain with neat sketch Roots Blower.
- f) Compare impulse and reaction turbine.
- g) Differentiate between BWR and PWR.
- 3. Solve any one out of (a) and (b) and solve any two out of (c) to (f):

13

- a) In a steady flow machine 405 kW of work is done by the machine. The flow rate of fluid is 3 kg/sec. The Sp. Volume of the fluid, pressure and velocity at the inlet are 0.45 m³/kg, 10 bar and 20 m/sec. The inlet is 36 m above the floor and discharge is at the floor level. The discharge conditions are 0.8 m³/kg, 3 bar and 320 m/sec respectively. The total heat loss between inlet and discharge is 12 kJ/kg of the fluid. Find the change in Sp. internal energy.
- 5

5

b) Explain with neat sketch working of Hydro-electric power plant. State its advantage and disadvantages.

Set Q

4.

5.



c)	1 kg of air at 10 bar and 0.15 m^3 volume is expanded to volume of 0.75 m^3 . Determine the final temperature, work done and heat transfer during the process, if the expansion is at constant pressure. Take R = 0.287 kJ/kgk, Cv = 0.7 kJ/kgk for air.	4
d)	Explain Single Acting Reciprocating Pump with neat sketch.	4
e)	Explain with neat sketch working of Steam Power plant.	4
f)	A cylinder contains 10 kg of working fluid. During period, piston moves out and the temperature of the system falls from 125°C to 65°C. Heat rejected through the cylinder walls is 40 kJ. The sp. internal energy and temperature are related to each other by law $u = [50 + t/1.5]kJ/kg$, where 't' is in °C. Calculate the work transferred.	4
	SECTION - II	
So	lve any five out of seven : (5×3=	15)
a)	Write the difference between SI and CI Engine.	
,	In an air standard Otto cycle pressure ratio during the compression is 18. The temperature of air at beginning of compression is 27°C. Maximum temperature attained in a cycle is 2200°C. Determine thermal efficiency of cycle and work done. Compare belt drive with chain drive.	
,	Explain types of gear train with neat sketch.	
	Write a note on sustainable design.	
f)	Explain different modes of failure while designing a machine component.	
g)	Explain different operations in Lathe Machine.	
So	live any one out of (a) and (b) and solve any two out of (c) to (f):	13
	Two pulley one 600 mm diameter and other 400 mm diameter are on parallel shaft are 4 meter apart are connected by cross belt drive. Find length of belt required and angle of contact between belt and pulley. What power can be transmitted when larger pulley rotates at 450 rpm, if maximum permissible tension is 3 kN and coefficient of friction between belt and pulley is 0.3?	5
b)	Draw block diagram of Pillar Drilling Machine. Explain function of basic elements.	5
c)	An air standard diesel cycle has compression ratio of 18 and the heat addition referred to working fluid per cycle 1800 kJ/kg. At the beginning of compression	
	stroke the pressure is 1 bar and the temperature is 27°C. Find Thermal efficiency.	4
-	Explain stepwise design procedure while designing of any mechanical component	. 4
e)	Explain with neat sketch brazing process. State its advantages, limitations and applications.	4
f\	State advantages and limitations of gas welding.	4
1)	Clate devellages and initiations of gas welding.	7

I		
٠	 	

SLR-EP - 4

Seat No.	Set	R

F.E. (Part – I) (New) (CBCS) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 19-12-2016	Total Marks : 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Q. 2 and Q. 4 are short answer type questions.
- 3) Q. 3 and Q. 5 are long answer type questions.
- 4) Figures to the **right** indicate **full** marks.
- 5) Assume suitable data if necessary and mention them clearly.
- 6) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

		7)	Ansv	ver MCQ/Obj	ective	B. Each questi e type question e, Q.P. Set (P/0	ons or	n Page N	lo. 3 only.
Dur	ation	n : 30 Minutes	M	CQ/Objective	е Туре	Questions			Marks : 14
1.	Cho	oose the correct a	nswer	:					14
	1)	For low head and a) Centrifugal putc) Vane pumps	•	discharge wh	b)	mp is used Reciprocatinດ None	g pum	ps	
	2)	The flow of water a) Radial		ry of Kaplan ⁻ Tangential		e is Axial	– d)	None	
	3)	To reduce excess a) Track rash	-	essure of wate Valve		e pipeline to tu Surge Tank		he device Breakin	
	4)	Thermal efficience	y of a	four stroke cy	ycle er	ngine as comp	are to	two stro	ke cycle
		a) More			b)	Less			
		c) Same			d)	None of the a	bove		
	5)	Otto cycle is also	called	las					
		a) Constant pres	sure c	cycle	b)	Constant volu	ume cy	/cle	
		c) Constant temp	peratu	re cycle	d)	None			
	6)	For maximum por	wer tra	ansmission ce	ntrifug	al tension in th	ne belt	t	
		a) Tc = Tmax			b)	Tc = T1 + T2			
		c) $Tc = Tmax/3$			d)	Tc = Tmax - T	T1		



7)	If for power transmission the motion of the drive		ear train consisting of 8 gears is used, then will be in the			
	a) Same direction		b)	Opposite direction	on	
	c) Both a) and b)		d)	None of the above	ve	
8)	Man, machine and work a product in	king environment r	ela	tionship is consid	ered	d while designing
	a) Ergonomic conside	eration	b)	Thermodynamic	s	
	c) Air conditioning		d)	Aesthetic consid	lera	tion
9)	Sustainable design cor	nsist of				
,	a) Use of recycled ma	ıterial				
	b) Less consumption of	of natural resource	es			
	c) Eco-friendly design	1				
	d) All of above					
10)	Which of the following	welding process r	eq	uires external pre	essu	ıre?
ŕ	a) Electric arc welding	9	b)	Oxyacetylene ga	as w	velding
	c) Spot welding		d)	None		
11)	Which of the following	is not a property o	of th	ne system ?		
·	a) Temperature b) Pressure	c)	Heat	d)	Volume
12)	Second law of thermod	dynamics defines				
	a) Enthalpy b) Entropy	c)	Heat	d)	Work
13)	For the same expansion as compared to work d		the	ermal process is	of a	diabatic process
	a) Same		,	More		
	c) Less		d)	None of the above	ve	
14)	An isothermal process	is governed by				
	a) Charle's law		,	Boyle's law		
	c) Joules law		d)	Gay-Lussac law		



Seat	
No.	

F.E. (Part – I) (New) (CBCS) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

2) Q. 2 and Q. 4 are short answer type questions.3) Q. 3 and Q. 5 are long answer type questions.

4) Figures to the **right** indicate **full** marks.

5) Assume suitable data if necessary and mention them clearly.

SECTION - I

2. Solve any five out of seven:

 $(5 \times 3 = 15)$

a) State and explain second law of thermodynamics.

b) A cycle consists of four processes; the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kW)	W (kW)	Δ U (kW)
1 – 2	40	1	25
2 – 3	20	-10	_
3 – 4	-20	_	_
4 – 1	0	8	_

- c) Explain with neat sketch Window air conditioner.
- d) Derive relation between Cp, Cv, R and γ .
- e) Explain with neat sketch Roots Blower.
- f) Compare impulse and reaction turbine.
- g) Differentiate between BWR and PWR.
- 3. Solve any one out of (a) and (b) and solve any two out of (c) to (f):

13

- a) In a steady flow machine 405 kW of work is done by the machine. The flow rate of fluid is 3 kg/sec. The Sp. Volume of the fluid, pressure and velocity at the inlet are 0.45 m³/kg, 10 bar and 20 m/sec. The inlet is 36 m above the floor and discharge is at the floor level. The discharge conditions are 0.8 m³/kg, 3 bar and 320 m/sec respectively. The total heat loss between inlet and discharge is 12 kJ/kg of the fluid. Find the change in Sp. internal energy.
- 5

5

b) Explain with neat sketch working of Hydro-electric power plant. State its advantage and disadvantages.

Set R

ıma	οf	0.7	'5 I	m 3	

c) 1 kg of air at 10 bar and 0.15 m^3 volume is expanded to volume of 0.75 m^3 . Determine the final temperature, work done and heat transfer during the process, if the expansion is at constant pressure. Take R = 0.287 kJ/kgk, Cv = 0.7 kJ/kgk for air.

d) Explain Single Acting Reciprocating Pump with neat sketch.

- e) Explain with neat sketch working of Steam Power plant.
- f) A cylinder contains 10 kg of working fluid. During period, piston moves out and the temperature of the system falls from 125° C to 65° C. Heat rejected through the cylinder walls is 40 kJ. The sp. internal energy and temperature are related to each other by law u = [50 + t/1.5]kJ/kg, where 't' is in °C. Calculate the work transferred.

SECTION - II

4. Solve any five out of seven:

 $(5 \times 3 = 15)$

4

4

13

5

4

- a) Write the difference between SI and CI Engine.
- b) In an air standard Otto cycle pressure ratio during the compression is 18. The temperature of air at beginning of compression is 27°C. Maximum temperature attained in a cycle is 2200°C. Determine thermal efficiency of cycle and work done.
- c) Compare belt drive with chain drive.
- d) Explain types of gear train with neat sketch.
- e) Write a note on sustainable design.
- f) Explain different modes of failure while designing a machine component.
- g) Explain different operations in Lathe Machine.
- 5. Solve any one out of (a) and (b) and solve any two out of (c) to (f):
 - a) Two pulley one 600 mm diameter and other 400 mm diameter are on parallel shaft are 4 meter apart are connected by cross belt drive. Find length of belt required and angle of contact between belt and pulley. What power can be transmitted when larger pulley rotates at 450 rpm, if maximum permissible tension is 3 kN and coefficient of friction between belt and pulley is 0.3?
 - b) Draw block diagram of Pillar Drilling Machine. Explain function of basic elements. 5
 - c) An air standard diesel cycle has compression ratio of 18 and the heat addition referred to working fluid per cycle 1800 kJ/kg. At the beginning of compression stroke the pressure is 1 bar and the temperature is 27°C. Find Thermal efficiency.
 - d) Explain stepwise design procedure while designing of any mechanical component. 4
 - e) Explain with neat sketch brazing process. State its advantages, limitations and applications.
 - f) State advantages and limitations of gas welding.

SLR-EP - 4

Seat	
No.	

Set S

F.E. (Part – I) (New) (CBCS) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. 2 and Q. 4 are short answer type questions.
- 3) Q. 3 and Q. 5 are long answer type questions.
- 4) Figures to the **right** indicate **full** marks.
- 5) Assume suitable data if necessary and mention them clearly.
- 6) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 7) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

- 1) For maximum power transmission centrifugal tension in the belt
 - a) Tc = Tmax

b) Tc = T1 + T2

c) Tc = Tmax/3

- d) Tc = Tmax T1
- 2) If for power transmission, a simple gear train consisting of 8 gears is used, then the motion of the driver and follower will be in the
 - a) Same direction

b) Opposite direction

c) Both a) and b)

- d) None of the above
- 3) Man, machine and working environment relationship is considered while designing a product in
 - a) Ergonomic consideration
- b) Thermodynamics

c) Air conditioning

- d) Aesthetic consideration
- 4) Sustainable design consist of
 - a) Use of recycled material
 - b) Less consumption of natural resources
 - c) Eco-friendly design
 - d) All of above



5)	5) Which of the following welding process requires external pressure?					
	a) Electric arc weldi	ing	b)	Oxyacetylene ga	as v	velding
	c) Spot welding		d)	None		
6)	Which of the following	g is not a property o	of th	ne system ?		
	a) Temperature	b) Pressure	c)	Heat	d)	Volume
7)	Second law of therm	odynamics defines				
	a) Enthalpy	b) Entropy	c)	Heat	d)	Work
8)	For the same expans as compared to work		othe	ermal process is	of a	diabatic process
	a) Same		,	More		
	c) Less		d)	None of the above	ve	
9)	An isothermal proces	ss is governed by				
	a) Charle's law		,	Boyle's law		
	c) Joules law		d)	Gay-Lussac law		
10)	For low head and high	_	•	•		
	a) Centrifugal pump)	,	Reciprocating po	ump	OS
	c) Vane pumps		,	None		
11)	The flow of water at	•				
	a) Radial	b) Tangential	,	Axial	,	None
12)	To reduce excessive	•				
	a) Track rash	b) Valve	C)	Surge Tank	d)	Breaking jet
13)	Thermal efficiency o engine is	f a four stroke cycle	e er	ngine as compare	e to	two stroke cycle
	a) More		b)	Less		
	c) Same		d)	None of the above	ve	
14)	Otto cycle is also cal	lled as				
	a) Constant pressur	e cycle	b)	Constant volume	е су	rcle
	c) Constant tempera	ature cycle	d)	None	-	
	•	-				



Seat	
No.	

F.E. (Part – I) (New) (CBCS) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. 2 and Q. 4 are short answer type questions.3) Q. 3 and Q. 5 are long answer type questions.
- 4) Figures to the right indicate full marks.
- 5) Assume suitable data **if necessary** and mention them **clearly**.

SECTION - I

2. Solve any five out of seven:

 $(5 \times 3 = 15)$

- a) State and explain second law of thermodynamics.
- b) A cycle consists of four processes; the energy transfer in each process is tabulated below. Complete the table and determine the network of the cycle.

Process	Q (kW)	W (kW)	Δ U (kW)
1 – 2	40	_	25
2 – 3	20	-10	_
3 – 4	-20	_	_
4 – 1	0	8	_

- c) Explain with neat sketch Window air conditioner.
- d) Derive relation between Cp, Cv, R and γ .
- e) Explain with neat sketch Roots Blower.
- f) Compare impulse and reaction turbine.
- g) Differentiate between BWR and PWR.
- 3. Solve any one out of (a) and (b) and solve any two out of (c) to (f):

13

- a) In a steady flow machine 405 kW of work is done by the machine. The flow rate of fluid is 3 kg/sec. The Sp. Volume of the fluid, pressure and velocity at the inlet are 0.45 m³/kg, 10 bar and 20 m/sec. The inlet is 36 m above the floor and discharge is at the floor level. The discharge conditions are 0.8 m³/kg, 3 bar and 320 m/sec respectively. The total heat loss between inlet and discharge is 12 kJ/kg of the fluid. Find the change in Sp. internal energy.
- 5

5

b) Explain with neat sketch working of Hydro-electric power plant. State its advantage and disadvantages.

Set S

4.

5.



d) e) f)	1 kg of air at 10 bar and 0.15 m^3 volume is expanded to volume of 0.75 m^3 . Determine the final temperature, work done and heat transfer during the process, if the expansion is at constant pressure. Take R = 0.287 kJ/kgk, Cv = 0.7 kJ/kgk for air. Explain Single Acting Reciprocating Pump with neat sketch. Explain with neat sketch working of Steam Power plant. A cylinder contains 10 kg of working fluid. During period, piston moves out and the temperature of the system falls from 125°C to 65°C. Heat rejected through the cylinder walls is 40 kJ. The sp. internal energy and temperature are related to each other by law $u = [50 + t/1.5]$ kJ/kg, where 't' is in °C. Calculate the work transferred.	4 4 4
	SECTION - II	
a) b) c) d) e) f)	ve any five out of seven: Write the difference between SI and CI Engine. In an air standard Otto cycle pressure ratio during the compression is 18. The temperature of air at beginning of compression is 27°C. Maximum temperature attained in a cycle is 2200°C. Determine thermal efficiency of cycle and work done. Compare belt drive with chain drive. Explain types of gear train with neat sketch. Write a note on sustainable design. Explain different modes of failure while designing a machine component. Explain different operations in Lathe Machine.	15)
a) b) c) d) e)	ve any one out of (a) and (b) and solve any two out of (c) to (f): Two pulley one 600 mm diameter and other 400 mm diameter are on parallel shaft are 4 meter apart are connected by cross belt drive. Find length of belt required and angle of contact between belt and pulley. What power can be transmitted when larger pulley rotates at 450 rpm, if maximum permissible tension is 3 kN and coefficient of friction between belt and pulley is 0.3? Draw block diagram of Pillar Drilling Machine. Explain function of basic elements. An air standard diesel cycle has compression ratio of 18 and the heat addition referred to working fluid per cycle 1800 kJ/kg. At the beginning of compression stroke the pressure is 1 bar and the temperature is 27°C. Find Thermal efficiency. Explain stepwise design procedure while designing of any mechanical component. Explain with neat sketch brazing process. State its advantages, limitations and applications.	13 5 5 4 4
f)	State advantages and limitations of gas welding.	4

SLR-EP - 6

Seat	
No.	



F.E. (Part – I) (Old – CGPA) Examination, 2016 **ENGINEERING MATHEMATICS - I**

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct option:

14

- 1) The constant term in the expansion of log (1 + sin x) is
 - a) 1

- b) -1
- c) $\frac{1}{2}$
- d) 0

2) If
$$y = (-2)^x$$
 then $y_n = a$ $2^n (-2)^x$

- b) $2^n (\log 2)^x$ c) $-(2)^n (-2)^x$
- d) None of these

3) If $y = \cos^2 x$ then $y_n =$

a)
$$2^n \cos\left(2x + \frac{n\pi}{2}\right)$$

b)
$$2^{n-1} \cos \left(2x + \frac{n\pi}{2} \right)$$

c)
$$2\cos\left(2x+\frac{n\pi}{2}\right)$$

- d) None
- 4) The hyperbolic sech (ix) is
 - a) sec x

b) i sec x

c) - sec x

- d) None of these
- 5) The imaginary part of $\cos h (x + iy)$ is
 - a) sin x sin hy

b) - sinx sin hy

c) sin hx sin y

- d) sin hx sin hy
- 6) The argument of complex number $(1 \cos \alpha) + i \sin \alpha$ is

b) $\frac{\pi}{2} - \alpha$



- 7) The real part of $e^{5+i\frac{\pi}{2}}$ is
 - a) ie⁵
- b) $-ie^5$
- c) e^5
- d) None

- 8) The rank of the matrix $\begin{bmatrix} 555 & 666 & 888 \\ 555 & 666 & 888 \\ 555 & 666 & 888 \end{bmatrix}$ is
 - a) 0

- b) 1
- c) 2
- d) 3
- 9) The system 3x + 4y + 2z = 4, 9x + 12x + 6z = 12 has
 - a) Infinitely many solutions
 - b) No solution
 - c) Unique solution
 - d) Linearly independent solutions
- 10) If 2, 3, 4 are the eigen values of A, then determinant of A is equal to
 - a) 9

- b) $\frac{1}{9}$
- c) 24
- d) $\frac{1}{24}$
- 11) If $X_1, X_2, X_3, \dots, X_n$ are linearly dependent vectors, then the vectors X_1, X_2, \dots, X_{n-1} are
 - a) Linearly dependent

b) All zero

c) All equal

- d) Linearly independent
- 12) If $f(x) = \log (x \tan^{-1} y)$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to
 - a) $-\frac{1}{x^2}$

b) 0

c) $\frac{1}{x}$

- d) $\frac{1}{x^2}$
- 13) If $u = \frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{5}} + y^{\frac{1}{5}}}$, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$
 - a) 4u

b) 5u

c) 20u

- d) $\frac{u}{20}$
- 14) If $u = x^2 + y^2$, then the approximate value of u when x = 1.1 and y = 2.1 is
 - a) 5.6

b) (1.1)²

c) $(2.1)^2$

d) 4.3



Seat No.

F.E. (Part – I) (Old – CGPA) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

2) Figures to the **right** indicate **full** marks.

3) Use of calculator is allowed.

SECTION - I

2. a) If
$$\sin((\theta + i\theta)) = \rho(\cos\alpha + i\sin\alpha)$$
, prove $\rho^2 = \frac{1}{2}[\cosh 2\phi - \cos 2\theta]$.

b) If
$$\log (x + iy) = e^{p + iq}$$
 prove that $y = x \tan \theta$ where $2\theta = \tan q \log (x^2 + y^2)$.

c) Prove that
$$tan h^{-1} (sin \theta) = cosh^{-1} (sec \theta)$$
.

3. a) If
$$x_r = \cos \frac{\pi}{3^r} + i \sin \frac{\pi}{3^r}$$
 prove that $x_1, x_2 ... x_\infty = i$.

b) Express
$$\cos 8\theta$$
 in powers of $\sin \theta$ and $\cos \theta$.

c) Find the roots of
$$x^5 = 1 + i$$
.

4. a) If
$$y = \frac{x^4}{(x-1)(x-2)}$$
 find y_n .

b) If
$$y = e^{2x} \sin \frac{x}{2} \cos \frac{3x}{2}$$
 find y_n .

c) If
$$x = e^t$$
 and $y = cosmt$ prove that $x^2y_{n+2} + (2n+1)xy_{n+1} + (n^2+m^2)y_n = 0$. (3+1=4)

5. a) Prove that
$$\sin(e^x - 1) = x + \frac{x^2}{2} - \frac{5}{24}x^4 + \dots$$

b) Expand
$$f(x) = x^3 + 3x^2 + 15x - 10$$
 in powers of $(x - 1)$ and hence find $f(\frac{11}{10})$.

c) Evaluate
$$\lim_{x \to 1} \left[\frac{1}{\log x} - \frac{x}{x - 1} \right]$$
.

OR

c) Expand log (sec $x + \tan x$) by using Maclaurins theorem upto power x^3 .



3

3

3

3

4

SECTION - II

- 6. Attempt the following:
 - a) Find the rank of the following matrix by reducing it to normal form A = $\begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & -1 & 3 & 2 \\ 3 & -5 & 2 & 2 \\ 6 & -3 & 8 & 6 \end{bmatrix}$.
 - b) Test the consistency and hence solve the following set of equation

$$x_1 + 2x_2 + x_3 = 2$$

 $3x_1 + x_2 - 2x_3 = 1$
 $4x_1 - 3x_2 - x_3 = 3$
 $2x_1 + 4x_2 + 2x_3 = 4$

c) Find the values of k such that the system of equations

$$x + ky + 3z = 0$$

 $4x + 3y + kz = 0$
 $2x + y + 2z = 0$ has non-trivial solution.

- 7. Attempt the following:
 - a) Examine for linear independent the following set of vectors [2, -1, 4], [0, 1, 2], [6, -1, 16], [4, 0, 12].
 - b) Find all the eigen values and eigen vector corresponding to the largest eigen value

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}.$$

c) Find the characteristic equation of the matrix A given below and hence, find the matrix

represented by
$$A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$$
 where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$.

8. Attempt the following:

a) If
$$u = \log (x^3 + y^3 + z^3 - 3xyz)$$
, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{\left(x + y + z\right)^2}$.

b) If
$$u = tan^{-1} \left[\frac{x^3 + y^3}{2x + 3y} \right]$$
, prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = sin4u = sin 2u$.

- 9. Attempt the following:
 - a) Find approximate value of $[(0.98)^2 + (2.01)^2 + (1.94)^2]^{1/2}$.

b) If $u = \frac{x+y}{1-xy}$, $v = \tan^{-1}x + \tan^{-1}y$ find $\frac{\partial(u,v)}{\partial(x,y)}$.

c) Examine the function $f(x, y) = y^2 + 4xy + 3x^2 + x^3$ for extreme values.

Set P

SLR-EP - 6

Seat	
No.	

Set



F.E. (Part – I) (Old – CGPA) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the right indicate full marks.
- 3) Use of calculator is allowed.
- 4) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct option:

14

- 1) The rank of the matrix $\begin{bmatrix} 555 & 666 & 888 \\ 555 & 666 & 888 \end{bmatrix}$ is $\begin{bmatrix} 555 & 666 & 888 \\ 555 & 666 & 888 \end{bmatrix}$
 - a) 0

- b) 1
- c) 2
- d) 3
- 2) The system 3x + 4y + 2z = 4, 9x + 12x + 6z = 12 has
 - a) Infinitely many solutions
 - b) No solution
 - c) Unique solution
 - d) Linearly independent solutions
- 3) If 2, 3, 4 are the eigen values of A, then determinant of A is equal to
 - a) 9

b) $\frac{1}{a}$

c) 24

- d) $\frac{1}{24}$
- 4) If $X_1, X_2, X_3, \dots, X_n$ are linearly dependent vectors, then the vectors X_1, X_2, \dots, X_{n-1} are
 - a) Linearly dependent
 - b) All zero
 - c) All equal
 - d) Linearly independent



- 5) If $f(x) = \log (x \tan^{-1} y)$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to
 - a) $-\frac{1}{x^2}$
- b) 0
- c) $\frac{1}{x}$
- d) $\frac{1}{v^2}$

- 6) If $u = \frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{5}} + y^{\frac{1}{5}}}$, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$
 - a) 4u

b) 5u

c) 20u

- 7) If $u = x^2 + y^2$, then the approximate value of u when x = 1.1 and y = 2.1 is

b) $(1.1)^2$

c) $(2.1)^2$

- d) 4.3
- 8) The constant term in the expansion of $\log (1 + \sin x)$ is
 - a) 1

- b) -1
- c) $\frac{1}{2}$
- d) 0

- 9) If $y = (-2)^x$ then $y_n = a$ $2^n (-2)^x$
- b) 2ⁿ (log 2)^x
- c) $-(2)^n (-2)^x$
- d) None of these

- 10) If $y = \cos^2 x$ then $y_n =$
 - a) $2^n \cos \left(2x + \frac{n\pi}{2}\right)$

b) $2^{n-1}\cos\left(2x+\frac{n\pi}{2}\right)$

c) $2\cos\left(2x+\frac{n\pi}{2}\right)$

- d) None
- 11) The hyperbolic sech (ix) is
 - a) sec x

b) i sec x

c) - sec x

- d) None of these
- 12) The imaginary part of $\cos h (x + iy)$ is
 - a) sin x sin hy

b) - sinx sin hy

c) sin hx sin y

- d) sin hx sin hy
- 13) The argument of complex number $(1 \cos \alpha) + i \sin \alpha$ is
 - a) $\frac{\pi}{4} \frac{\alpha}{2}$

b) $\frac{\pi}{2} - \alpha$

c) $\frac{\pi}{2} - \frac{\alpha}{2}$

- d) $\frac{\pi}{2} \frac{\alpha}{4}$
- 14) The real part of $e^{5+i\frac{\pi}{2}}$ is $e^{5+i\frac{\pi}{2}}$ b) $-ie^5$
- $c) e^{5}$
- d) None



Seat	
Jeal	
No.	
INU.	

F.E. (Part – I) (Old – CGPA) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

2) Figures to the **right** indicate **full** marks.

3) Use of calculator is allowed.

SECTION - I

2. a) If
$$\sin((\theta + i\theta)) = \rho(\cos\alpha + i\sin\alpha)$$
, prove $\rho^2 = \frac{1}{2}[\cosh 2\phi - \cos 2\theta]$.

b) If $\log (x + iy) = e^{p + iq}$ prove that $y = x \tan \theta$ where $2\theta = \tan q \log (x^2 + y^2)$.

c) Prove that $tan h^{-1} (sin \theta) = cosh^{-1} (sec \theta)$.

3. a) If
$$x_r = \cos \frac{\pi}{3^r} + i \sin \frac{\pi}{3^r}$$
 prove that $x_1, x_2 ... x_\infty = i$.

b) Express $\cos 8\theta$ in powers of $\sin \theta$ and $\cos \theta$.

c) Find the roots of $x^5 = 1 + i$.

4. a) If
$$y = \frac{x^4}{(x-1)(x-2)}$$
 find y_n .

b) If $y = e^{2x} \sin \frac{x}{2} \cos \frac{3x}{2}$ find y_n .

c) If $x = e^t$ and y = cosmt prove that $x^2y_{n+2} + (2n+1)xy_{n+1} + (n^2+m^2)y_n = 0$. (3+1=4)

5. a) Prove that
$$\sin(e^x - 1) = x + \frac{x^2}{2} - \frac{5}{24}x^4 + \dots$$

b) Expand $f(x) = x^3 + 3x^2 + 15x - 10$ in powers of (x - 1) and hence find $f(\frac{11}{10})$.

c) Evaluate
$$\lim_{x\to 1} \left[\frac{1}{\log x} - \frac{x}{x-1} \right]$$
.

OR

c) Expand log (sec $x + \tan x$) by using Maclaurins theorem upto power x^3 .



SECTION - II

- 6. Attempt the following:
 - a) Find the rank of the following matrix by reducing it to normal form $A = \begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & -1 & 3 & 2 \\ 3 & -5 & 2 & 2 \\ 6 & -3 & 8 & 6 \end{bmatrix}$.
 - b) Test the consistency and hence solve the following set of equation

$$x_1 + 2x_2 + x_3 = 2$$

 $3x_1 + x_2 - 2x_3 = 1$
 $4x_1 - 3x_2 - x_3 = 3$

 $2x_1 + 4x_2 + 2x_3 = 4$ c) Find the values of k such that the system of equations

$$x + ky + 3z = 0$$
$$4x + 3y + kz = 0$$

2x + y + 2z = 0 has non-trivial solution.

3

3

3

- 7. Attempt the following:
 - a) Examine for linear independent the following set of vectors [2, -1, 4], [0, 1, 2], [6, -1, 16], [4, 0, 12].3
 - b) Find all the eigen values and eigen vector corresponding to the largest eigen value

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}.$$

- c) Find the characteristic equation of the matrix A given below and hence, find the matrix
 - represented by $A^8 5A^7 + 7A^6 3A^5 + A^4 5A^3 + 8A^2 2A + I$ where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$. 3
- 8. Attempt the following:
 - a) If $u = \log (x^3 + y^3 + z^3 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{(x + y + z)^2}$. 5
 - b) If $u = tan^{-1} \left[\frac{x^3 + y^3}{2x + 3y} \right]$, prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = sin4u = sin 2u$. 4
- 9. Attempt the following:
 - a) Find approximate value of $[(0.98)^2 + (2.01)^2 + (1.94)^2]^{1/2}$
 - b) If $u = \frac{x + y}{1 xy}$, $v = \tan^{-1}x + \tan^{-1}y$ find $\frac{\partial(u, v)}{\partial(x, y)}$. 3
 - c) Examine the function $f(x, y) = y^2 + 4xy + 3x^2 + x^3$ for extreme values. 4

Set Q

SLR-EP - 6

Seat	
No.	

Set



14

F.E. (Part – I) (Old – CGPA) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Attempt any three questions from each Section.
 - 2) Figures to the right indicate full marks.
 - 3) Use of calculator is allowed.
 - 4) Q. No. 1 is **compulsory**. It should be solved in **first 30 minutes** in Answer Book Page No. 3. **Each** question carries **one** mark.
 - 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

- 1. Choose the correct option:
 - 1) The imaginary part of $\cos h (x + iy)$ is
 - a) sin x sin hy

b) - sinx sin hy

c) sin hx sin y

- d) sin hx sin hy
- 2) The argument of complex number $(1 \cos \alpha) + i \sin \alpha$ is

a)
$$\frac{\pi}{4} - \frac{\alpha}{2}$$

b)
$$\frac{\pi}{2} - c$$

c)
$$\frac{\pi}{2} - \frac{\alpha}{2}$$

d)
$$\frac{\pi}{2} - \frac{\alpha}{4}$$

- 3) The real part of $e^{5+i\frac{\pi}{2}}$ is
 - a) ie⁵
- b) $-ie^5$
- $c) e^{5}$
- d) None

- 4) The rank of the matrix $\begin{bmatrix} 555 & 666 & 888 \\ 555 & 666 & 888 \\ 555 & 666 & 888 \end{bmatrix}$ is
 - a) 0

- b) 1
- c) 2
- d) 3
- 5) The system 3x + 4y + 2z = 4, 9x + 12x + 6z = 12 has
 - a) Infinitely many solutions
 - b) No solution
 - c) Unique solution
 - d) Linearly independent solutions

- 6) If 2, 3, 4 are the eigen values of A, then determinant of A is equal to
 - a) 9

- b) $\frac{1}{9}$
- c) 24
- d) $\frac{1}{24}$
- 7) If $X_1, X_2, X_3, \dots, X_n$ are linearly dependent vectors, then the vectors X_1, X_2, \dots, X_{n-1} are
 - a) Linearly dependent

b) All zero

c) All equal

- d) Linearly independent
- 8) If $f(x) = \log (x \tan^{-1} y)$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to
 - a) $-\frac{1}{\sqrt{2}}$

b) 0

c) $\frac{1}{x}$

- d) $\frac{1}{\sqrt{2}}$
- 9) If $u = \frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{5}} + v^{\frac{1}{5}}}$, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$
 - a) 4u

b) 5u

c) 20u

- 10) If $u = x^2 + y^2$, then the approximate value of u when x = 1.1 and y = 2.1 is

b) $(1.1)^2$

c) $(2.1)^2$

- d) 4.3
- 11) The constant term in the expansion of log (1 + sin x) is
 - a) 1

- b) -1
- c) $\frac{1}{2}$
- d) 0

- 12) If $y = (-2)^x$ then $y_n = a$ $2^n (-2)^x$
- b) $2^n (\log 2)^x$ c) $-(2)^n (-2)^x$
- d) None of these

- 13) If $y = \cos^2 x$ then $y_n =$
 - a) $2^n \cos \left(2x + \frac{n\pi}{2}\right)$

b) $2^{n-1} \cos \left(2x + \frac{n\pi}{2}\right)$

c) $2\cos\left(2x+\frac{n\pi}{2}\right)$

d) None

- 14) The hyperbolic sech (ix) is
 - a) sec x

b) i sec x

c) - sec x

d) None of these



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) If
$$\sin(\theta + i\theta) = \rho(\cos\alpha + i\sin\alpha)$$
, prove $\rho^2 = \frac{1}{2}[\cosh 2\phi - \cos 2\theta]$.

- b) If $\log (x + iy) = e^{p + iq}$ prove that $y = x \tan \theta$ where $2\theta = \tan q \log (x^2 + y^2)$.
- c) Prove that $tan h^{-1} (sin \theta) = cosh^{-1} (sec \theta)$.

3. a) If
$$x_r = \cos \frac{\pi}{3^r} + i \sin \frac{\pi}{3^r}$$
 prove that $x_1, x_2 ... x_\infty = i$.

- b) Express $\cos 8\theta$ in powers of $\sin \theta$ and $\cos \theta$.
- c) Find the roots of $x^5 = 1 + i$.

4. a) If
$$y = \frac{x^4}{(x-1)(x-2)}$$
 find y_n .

b) If
$$y = e^{2x} \sin \frac{x}{2} \cos \frac{3x}{2}$$
 find y_n .

c) If
$$x = e^t$$
 and $y = cosmt$ prove that $x^2y_{n+2} + (2n+1)xy_{n+1} + (n^2+m^2)y_n = 0$. (3+1=4)

5. a) Prove that
$$\sin(e^x - 1) = x + \frac{x^2}{2} - \frac{5}{24}x^4 + \dots$$

b) Expand
$$f(x) = x^3 + 3x^2 + 15x - 10$$
 in powers of $(x - 1)$ and hence find $f(11/10)$.

c) Evaluate
$$\lim_{x\to 1} \left[\frac{1}{\log x} - \frac{x}{x-1} \right]$$
.

OR

c) Expand log (sec $x + \tan x$) by using Maclaurins theorem upto power x^3 .

SECTION - II

6. Attempt the following:

- a) Find the rank of the following matrix by reducing it to normal form $A = \begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & -1 & 3 & 2 \\ 3 & -5 & 2 & 2 \\ 6 & -3 & 8 & 6 \end{bmatrix}$.
- b) Test the consistency and hence solve the following set of equation

$$x_1 + 2x_2 + x_3 = 2$$

 $3x_1 + x_2 - 2x_3 = 1$
 $4x_1 - 3x_2 - x_3 = 3$

 $2x_1 + 4x_2 + 2x_3 = 4$

c) Find the values of k such that the system of equations

$$x + ky + 3z = 0$$
$$4x + 3y + kz = 0$$

2x + y + 2z = 0 has non-trivial solution.

3

3

3

7. Attempt the following:

a) Examine for linear independent the following set of vectors

$$[2, -1, 4], [0, 1, 2], [6, -1, 16], [4, 0, 12].$$

3

b) Find all the eigen values and eigen vector corresponding to the largest eigen value

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}.$$

c) Find the characteristic equation of the matrix A given below and hence, find the matrix

represented by $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2$ A + I where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$. 3

8. Attempt the following:

a) If
$$u = \log (x^3 + y^3 + z^3 - 3xyz)$$
, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{\left(x + y + z\right)^2}$.

b) If
$$u = tan^{-1} \left[\frac{x^3 + y^3}{2x + 3y} \right]$$
, prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = sin4u = sin 2u$.

9. Attempt the following:

a) Find approximate value of $[(0.98)^2 + (2.01)^2 + (1.94)^2]^{1/2}$.

3

b) If
$$u = \frac{x+y}{1-xy}$$
, $v = \tan^{-1}x + \tan^{-1}y$ find $\frac{\partial(u, v)}{\partial(x, y)}$.

3 4

c) Examine the function $f(x, y) = y^2 + 4xy + 3x^2 + x^3$ for extreme values.

Set R



SLR-EP - 6

Seat	
No.	

Set S

F.E. (Part – I) (Old – CGPA) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Attempt any three questions from each Section.
 - 2) Figures to the right indicate full marks.
 - 3) Use of calculator is allowed.
 - 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct option:

14

- 1) If 2, 3, 4 are the eigen values of A, then determinant of A is equal to
 - a) 9

- b) $\frac{1}{9}$
- c) 24
- d) $\frac{1}{24}$
- 2) If $X_1, X_2, X_3, \dots, X_n$ are linearly dependent vectors, then the vectors X_1, X_2, \dots, X_{n-1} are
 - a) Linearly dependent

b) All zero

c) All equal

- d) Linearly independent
- 3) If $f(x) = \log (x \tan^{-1} y)$, then $\frac{\partial^2 f}{\partial x \partial y}$ is equal to

a)
$$-\frac{1}{x^2}$$

b) 0

c)
$$\frac{1}{x}$$

d) $\frac{1}{x^2}$

4) If
$$u = \frac{x^{\frac{1}{4}} + y^{\frac{1}{4}}}{x^{\frac{1}{5}} + y^{\frac{1}{5}}}$$
, then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$

a) 4u

b) 5u

c) 20u

d) $\frac{u}{20}$

- 5) If $u = x^2 + y^2$, then the approximate value of u when x = 1.1 and y = 2.1 is
 - a) 5.6

b) $(1.1)^2$

c) $(2.1)^2$

- d) 4.3
- 6) The constant term in the expansion of log (1 + sin x) is
 - a) 1

- b) -1
- c) $\frac{1}{2}$
- d) 0

- 7) If $y = (-2)^x$ then $y_n =$
 - a) $2^{n}(-2)^{x}$
- b) 2ⁿ (log 2)^x
- c) $-(2)^n (-2)^x$
- d) None of these

- 8) If $y = \cos^2 x$ then $y_n =$
 - a) $2^n \cos\left(2x + \frac{n\pi}{2}\right)$

b) $2^{n-1}\cos\left(2x+\frac{n\pi}{2}\right)$

c) $2\cos\left(2x+\frac{n\pi}{2}\right)$

- d) None
- 9) The hyperbolic sech (ix) is
 - a) sec x

b) i sec x

c) - sec x

- d) None of these
- 10) The imaginary part of $\cos h (x + iy)$ is
 - a) sin x sin hy

b) - sinx sin hy

c) sin hx sin y

- d) sin hx sin hy
- 11) The argument of complex number $(1 \cos \alpha) + i \sin \alpha$ is
 - a) $\frac{\pi}{4} \frac{\alpha}{2}$

b) $\frac{\pi}{2} - \alpha$

c) $\frac{\pi}{2} - \frac{\alpha}{2}$

d) $\frac{\pi}{2} - \frac{\alpha}{4}$

- 12) The real part of $e^{5+i\frac{\pi}{2}}$ is
 - a) ie⁵
- b) $-ie^5$
- c) e⁵
- d) None

- 13) The rank of the matrix 555 666 888 i 555 666 888
 - a) 0

- b) 1
- c) 2
- d) 3
- 14) The system 3x + 4y + 2z = 4, 9x + 12x + 6z = 12 has
 - a) Infinitely many solutions
 - b) No solution
 - c) Unique solution
 - d) Linearly independent solutions



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2016 ENGINEERING MATHEMATICS – I

Day and Date: Saturday, 10-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) If
$$\sin(\theta + i\theta) = \rho(\cos\alpha + i\sin\alpha)$$
, prove $\rho^2 = \frac{1}{2}[\cosh 2\phi - \cos 2\theta]$.

- b) If $\log (x + iy) = e^{p + iq}$ prove that $y = x \tan \theta$ where $2\theta = \tan q \log (x^2 + y^2)$.
- c) Prove that $tan h^{-1} (sin \theta) = cosh^{-1} (sec \theta)$.

3. a) If
$$x_r = \cos \frac{\pi}{3^r} + i \sin \frac{\pi}{3^r}$$
 prove that $x_1, x_2 ... x_\infty = i$.

- b) Express $\cos 8\theta$ in powers of $\sin \theta$ and $\cos \theta$.
- c) Find the roots of $x^5 = 1 + i$.

4. a) If
$$y = \frac{x^4}{(x-1)(x-2)}$$
 find y_n .

b) If
$$y = e^{2x} \sin \frac{x}{2} \cos \frac{3x}{2}$$
 find y_n .

c) If
$$x = e^t$$
 and $y = cosmt$ prove that $x^2y_{n+2} + (2n+1)xy_{n+1} + (n^2+m^2)y_n = 0$. (3+1=4)

5. a) Prove that
$$\sin(e^x - 1) = x + \frac{x^2}{2} - \frac{5}{24}x^4 + \dots$$

b) Expand
$$f(x) = x^3 + 3x^2 + 15x - 10$$
 in powers of $(x - 1)$ and hence find $f(11/10)$.

c) Evaluate
$$\lim_{x\to 1} \left[\frac{1}{\log x} - \frac{x}{x-1} \right]$$
.

OR

c) Expand log (sec $x + \tan x$) by using Maclaurins theorem upto power x^3 .



SECTION - II

6. Attempt the following:

- a) Find the rank of the following matrix by reducing it to normal form A = $\begin{bmatrix} 1 & 3 & 4 & 2 \\ 2 & -1 & 3 & 2 \\ 3 & -5 & 2 & 2 \\ 6 & -3 & 8 & 6 \end{bmatrix}$.
- b) Test the consistency and hence solve the following set of equation

$$x_1 + 2x_2 + x_3 = 2$$

 $3x_1 + x_2 - 2x_3 = 1$
 $4x_1 - 3x_2 - x_3 = 3$

 $2x_1 + 4x_2 + 2x_3 = 4$

c) Find the values of k such that the system of equations

$$x + ky + 3z = 0$$

$$4x + 3y + kz = 0$$

$$2x + y + 2z = 0$$
 has non-trivial solution.

3

3

3

7. Attempt the following:

a) Examine for linear independent the following set of vectors

$$[2, -1, 4], [0, 1, 2], [6, -1, 16], [4, 0, 12].$$

3

3

b) Find all the eigen values and eigen vector corresponding to the largest eigen value

$$A = \begin{bmatrix} -2 & 2 & -3 \\ 2 & 1 & -6 \\ -1 & -2 & 0 \end{bmatrix}.$$

c) Find the characteristic equation of the matrix A given below and hence, find the matrix

represented by
$$A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2 A + I$$
 where $A = \begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$. 3

- 8. Attempt the following:
 - a) If $u = \log (x^3 + y^3 + z^3 3xyz)$, show that $\left(\frac{\partial}{\partial x} + \frac{\partial}{\partial y} + \frac{\partial}{\partial z}\right)^2 u = \frac{-9}{\left(x + y + z\right)^2}$.
 - b) If $u = tan^{-1} \left[\frac{x^3 + y^3}{2x + 3y} \right]$, prove that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = sin4u = sin 2u$.
- 9. Attempt the following:
 - a) Find approximate value of $[(0.98)^2 + (2.01)^2 + (1.94)^2]^{1/2}$.
 - b) If $u = \frac{x+y}{1-xy}$, $v = \tan^{-1}x + \tan^{-1}y$ find $\frac{\partial(u,v)}{\partial(x,y)}$.
 - c) Examine the function $f(x, y) = y^2 + 4xy + 3x^2 + x^3$ for extreme values.

Set S

SLR-EP - 7

Seat No.		Set	Р
-------------	--	-----	---

F.E. (Part - I) (Old - CGPA) Examination, 2016 **APPLIED MECHANICS**

Day and Date: Wednesday, 14-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book Page No. 3. Each question carries one mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
 - 3) In Section I, Q. No. 2 is compulsory. Solve any two from the **remaining**.
 - 4) In Section II, solve any three questions.
 - 5) **Assume** suitable data if **necessary** and state it **clearly**.
 - 6) Use of non programmable scientific calculators is allowed.
 - 7) Figures to the **right** indicate **full** marks.

MCO/Objective Type Questions

		MCG/Objective	i ype Questions		
Duration	on : 30 Minutes	·			Marks: 14
1. Ch	noose the correct ar	nswer :			(14×1=14)
1)	If the size of the o the problem, it ma	bject is small com y be treated as	•	stances involve	d in
	a) body	b) object	c) particle	d) matter	
2)	Equilibriant is is a) twice, same c) same, opposite	to that of resulta		e	lirection
3)	If a body is in equ should be a) parallel	ilibrium under the	,	ee forces, they	
4)	A simply supporte reactions R _A and	d beam AB is subj R _B will be equal to	•	of 100 kN at its	scentre
	a) 100, 100 kN	b) 50, 50 kN	c) 60, 40 kN	d) 40,60 k	(N



5)	Polar moment of ine	ertia is related with	ıa	xis theorem.
	a) perpendicular	b) parallel	c) both a) and b)	d) none
6)	Moment of inertia o	of a rectangle with	width b, about its ba	ase is equal to
	a) $\frac{bd^3}{12}$	b) $\frac{db^3}{12}$	c) $\frac{bd^3}{3}$	d) $\frac{db^3}{3}$
7)	A frame is said to b more than that requ			nembers in it are
	a) redundant	b) deficient	c) both a) and b)	d) none
8)	Maximum range ofde	• •	ed when angle of p	rojection is
	a) 90	b) 45	c) 75	d) 30
9)	In projectile motion	, which of the follo	wing quantity rema	ins constant ?
	a) Speed		b) Y component o	of velocity
	c) X component of	velocity	d) none of the abo	ove
10)	Work energy princip	ple relates		
	a) force time displa	acement	b) force velocity ti	ime
	c) force displacem	ent velocity	d) force mass acc	eleration
11)	When a ball is throw particle is	vn up with a veloci	ity 'u', the maximum	n height reached by
	a) u ² /29	b) 2u ² /9	c) 2u/9	d) u/9
12)	The acceleration of of particle is 10 m/s from start		•	10. If initial velocity ticle after 1 second
	a) 2 m/s	b) 1 m/s	c) 12 m/s	d) 18 m/s
13)	Direction of velocity	/ and acceleration	in a rectilinear mot	ion are
	a) same	b) opposite	c) collinear	d) none of the above
14)	When body is lifted	up, work done by	force of gravity is _	
	a) +ve	b) zero	c) -ve	d) none



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) In Section – I, Q. No. 2 is compulsory. Solve any two from the remaining.

- 2) In Section II, solve any three questions.
- 3) **Assume** suitable data if necessary and state it **clearly**.
- 4) **Use** of non programmable scientific calculators is **allowed**.
- 5) Figures to the **right** indicate **full** marks.

SECTION - I

2. a) State and prove Varignon's theorem.

4

b) Determine the magnitude of the resultant of the four forces acting on a body as shown in Fig. 1. Also find its direction and position from point 'O'.

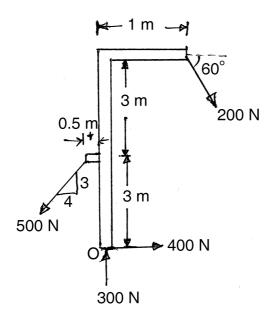


Fig. 1



3. a) State laws of friction.

3

b) What should be the value of θ in Fig. 2, that will make the motion of 900 kN block down the plane to impend? The coefficient of friction for all contact surfaces is $^{1}/_{3}$.

6

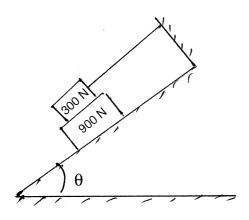


Fig. 2

4. a) State principle of virtual work.

2

b) Analyse the following truss and find forces in any four members. Use any method.

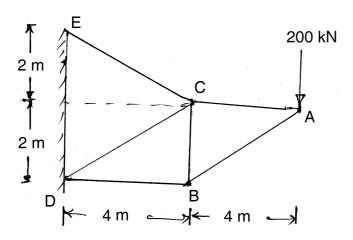


Fig. 3



- 5. a) Define polar moment of inertia.
 - b) Determine the moment of inertia of the shaded area as shown in fig. 4 about centroidal axis parallel to AB.

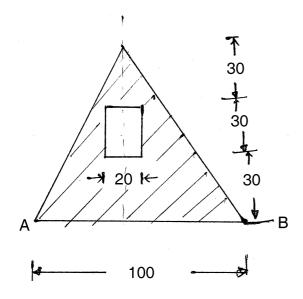


Fig. 4

SECTION - II

- 6. a) Define and explain concept of relative velocity.
 - b) A stone is thrown vertically upwards with an initial velocity u. Determine
 - i) Maximum height attained by stone
 - ii) Time of flight in the air and
 - iii) The velocity with which it strikes the ground back.

7. a) Explain concept of dynamic equilibrium.

b) Two bodies of weights 15 N and 3 N are connected to the two ends of a light intensible string. Passing over a smooth pulley. The weight 15 N is placed on rough horizontal surface while the weight 3 N is hanging vertically in air. Initially the friction between the weight of 15 N and table is just sufficient to prevent motion. If additional weight of 0.5 N is added to weight 3 N. Determine

Set P

7

3

7



- i) The acceleration of the weights and
- ii) Tension in the string after adding weight of 0.5 N to the weight 3 N. Take $g = 9.8 \text{ m/s}^2$ for details refer Fig. 5.

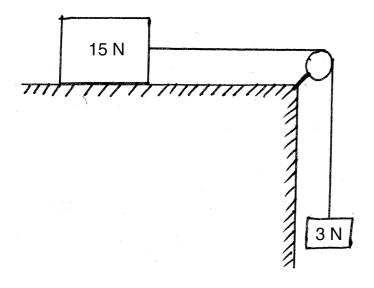


Fig. 5

8. a) Write the condition of maximum range in case of a projectile motion.

2

b) A man throws an iron ball with an initial velocity of 13 m/sec. What should be angle of projection if he has to reach a record of maximum height of 9 m from ground. Take height from which ball is released as 1.2 m.

7

9. a) Explain work-energy principle.

2

b) A body weighing 300 N is pushed up a 30° plane by 400 N force acting parallel to the plane. If the initial velocity of the body is 2 m/s and coefficient of kinetic friction is μ = 0.25, what velocity will the body have after moving 5 m?

SLR-EP - 7

F.E. (Part – I) (Old – CGPA) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book Page No. 3. Each question carries one mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
 - 3) In Section I, Q. No. 2 is compulsory. Solve any two from the remaining.
 - 4) In Section II, solve any three questions.
 - 5) **Assume** suitable data if **necessary** and state it **clearly**.
 - 6) **Use** of non programmable scientific calculators is **allowed**.
 - 7) Figures to the **right** indicate **full** marks.

		MCQ/Objective T	ype Questions		
Duratio	on : 30 Minutes				Marks: 14
1. Ch	oose the correct ans	swer:			(14×1=14)
1)	Maximum range ofde	projectile is obtain gree.	ed when angle of p	rojection is	
	a) 90	b) 45	c) 75	d) 30	
2)	In projectile motion	, which of the follo	wing quantity remai	ins constant	?
	a) Speed		b) Y component o	f velocity	
	c) X component of	velocity	d) none of the abo	ve	
3)	Work energy princi	ple relates			
	a) force time displa	acement	b) force velocity ti	me	
	c) force displacem	ent velocity	d) force mass acc	eleration	
4)	When a ball is throuparticle is	wn up with a veloci	ity 'u', the maximum	n height reac	ched by
	a) $u^2/29$	b) 2u ² /9	c) 2u/9	d) u/9	

5)	The acceleration of particle is 10 m/ from start		by equation a = 2t – velocity of the part		
	a) 2 m/s	b) 1 m/s	c) 12 m/s	d)	18 m/s
6)	Direction of velocit	y and acceleration	in a rectilinear mot	ion a	are
	a) same	b) opposite	c) collinear	d)	none of the above
7)	When body is lifted	d up, work done by	force of gravity is $_$		
	a) +ve	b) zero	c) -ve	d)	none
8)	If the size of the ob the problem, it may	•		nces	involved in
	a) body	b) object	c) particle	d)	matter
9)	Equilibriant is			tude	but its direction
	is	_ to that of resultar			
	a) twice, samec) same, opposite		b) half, opposited) opposite, same	7	
10)	If a body is in equil should be		,		es, they
	a) parallel	b) concurrent	c) non-concurrent	t d)	colinear
11)	A simply supported reactions R _A and F		cted to point load of	100	kN at its centre
	a) 100, 100 kN	b) 50, 50 kN	c) 60, 40 kN	d)	40, 60 kN
12)	Polar moment of in	ertia is related with	ıa	xis t	heorem.
	a) perpendicular	b) parallel	c) both a) and b)	d)	none
13)	Moment of inertia	of a rectangle with	width b, about its b	ase	is equal to
	a) $\frac{bd^3}{12}$	b) $\frac{db^3}{12}$	c) $\frac{bd^3}{3}$	d)	$\frac{db^3}{3}$
14)	A frame is said to be more than that requ			nem	bers in it are
	a) redundant	b) deficient	c) both a) and b)	d)	none



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) In Section – I, Q. No. 2 is compulsory. Solve any two from the remaining.

- 2) In Section II, solve any three questions.
- 3) **Assume** suitable data if necessary and state it **clearly**.
- 4) **Use** of non programmable scientific calculators is **allowed**.
- 5) Figures to the **right** indicate **full** marks.

SECTION - I

2. a) State and prove Varignon's theorem.

4

b) Determine the magnitude of the resultant of the four forces acting on a body as shown in Fig. 1. Also find its direction and position from point 'O'.

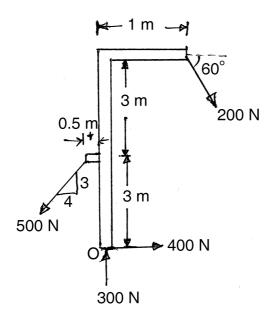


Fig. 1



3. a) State laws of friction.

3

b) What should be the value of θ in Fig. 2, that will make the motion of 900 kN block down the plane to impend? The coefficient of friction for all contact surfaces is $^{1}/_{3}$.

6

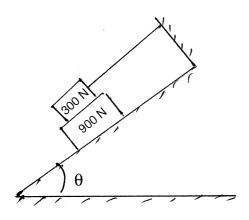


Fig. 2

4. a) State principle of virtual work.

2

b) Analyse the following truss and find forces in any four members. Use any method.

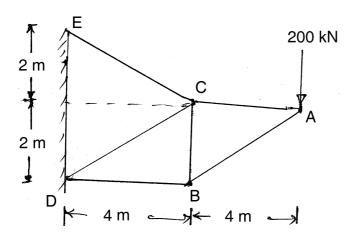


Fig. 3



- 5. a) Define polar moment of inertia.
 - b) Determine the moment of inertia of the shaded area as shown in fig. 4 about centroidal axis parallel to AB. **7**

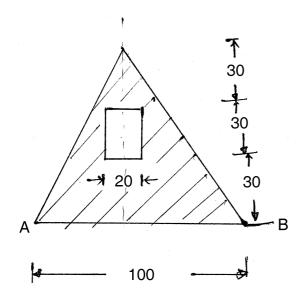


Fig. 4

SECTION - II

6. a) Define and explain concept of relative velocity.

- b) A stone is thrown vertically upwards with an initial velocity u. Determine
 - i) Maximum height attained by stone
 - ii) Time of flight in the air and
 - iii) The velocity with which it strikes the ground back.

7

3

7. a) Explain concept of dynamic equilibrium.

2

b) Two bodies of weights 15 N and 3 N are connected to the two ends of a light intensible string. Passing over a smooth pulley. The weight 15 N is placed on rough horizontal surface while the weight 3 N is hanging vertically in air. Initially the friction between the weight of 15 N and table is just sufficient to prevent motion. If additional weight of 0.5 N is added to weight 3 N. Determine



- i) The acceleration of the weights and
- ii) Tension in the string after adding weight of 0.5 N to the weight 3 N. Take $g = 9.8 \text{ m/s}^2$ for details refer Fig. 5.

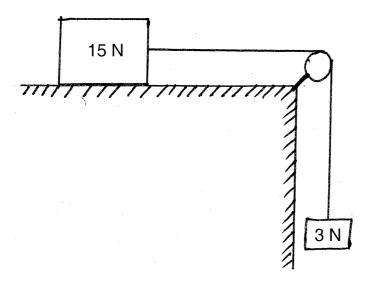


Fig. 5

8. a) Write the condition of maximum range in case of a projectile motion.

2

b) A man throws an iron ball with an initial velocity of 13 m/sec. What should be angle of projection if he has to reach a record of maximum height of 9 m from ground. Take height from which ball is released as 1.2 m.

7

9. a) Explain work-energy principle.

2

b) A body weighing 300 N is pushed up a 30° plane by 400 N force acting parallel to the plane. If the initial velocity of the body is 2 m/s and coefficient of kinetic friction is $\mu = 0.25$, what velocity will the body have after moving 5 m?

a) 90

SLR-EP - 7

Seat No. Set R	
----------------	--

	F.E. (Pa	rt – I) (Old – Co APPLIED I	•		, 2016	
-	d Date : Wednesda 0.00 a.m. to 1.00				Max.	Marks: 70
	2) 3) 4) 5) 6)	Q. No. 1 is comp minutes in Answe one mark. Answer MCQ/Ob only. Don't forge of Page. In Section – I, Q. N the remaining. In Section – II, so Assume suitable Use of non progra Figures to the rig	er book Page Djective type It to mention No. 2 is comp Ive any three data if neces mmable scie	No. 3. Ea e question e, Q.P. Sen oulsory. Sen e question essary and entific cald	ch question ons on Page t (P/Q/R/S) o Solve any two ns. d state it clea culators is al	carries e No. 3 on Top vo from arly.
Duration	n : 30 Minutes	MCQ/Objective	Type Quest	ions		Marks: 14
	oose the correct a	newar :				(14×1=14)
	Polar moment of i	nertia is related w				,
۵)	,	b) parallel		,	•	
ŕ	a) $\frac{bd^3}{12}$ c) $\frac{bd^3}{3}$	of a rectangle wit	b) $\frac{db^3}{12}$ d) $\frac{db^3}{3}$	out its da	ase is equai	το
		be quired for a perfec b) deficient				t are
4)	~	of projectile is obta legree.	ained when a	ngle of pr	rojection is	

c) 75

b) 45

d) 30

5)	In projectile motion	, which of the follow	wing quantity rema	ins constant ?
	a) Speed		b) Y component o	f velocity
	c) X component of	velocity	d) none of the abo	ove
6)	Work energy princip	ple relates		
	a) force time displa	acement	b) force velocity ti	me
	c) force displacem	ent velocity	d) force mass acc	eleration
7)	When a ball is throw particle is	wn up with a veloci	ity 'u', the maximum	n height reached by
	a) u ² /29	b) 2u ² /9	c) 2u/9	d) u/9
8)	The acceleration of of particle is 10 m/s from start		•	10. If initial velocity ticle after 1 second
	a) 2 m/s	b) 1 m/s	c) 12 m/s	d) 18 m/s
9)	Direction of velocity	y and acceleration	in a rectilinear mot	ion are
	a) same	b) opposite	c) collinear	d) none of the above
10)	When body is lifted	up, work done by	force of gravity is _	
	a) +ve	b) zero	c) -ve	d) none
11)	If the size of the ob the problem, it may	•		nces involved in
	a) body	b) object	c) particle	d) matter
12)	Equilibriant is			tude but its direction
	is	_ to that of resultan		
	a) twice, same		b) half, opposite	
	c) same, opposite		d) opposite, same	
13)	If a body is in equili should be	brium under the a	ction of only three f	orces, they
	a) parallel	b) concurrent	c) non-concurrent	d) colinear
14)	A simply supported reactions R_A and R		cted to point load of	100 kN at its centre
	a) 100, 100 kN	b) 50, 50 kN	c) 60, 40 kN	d) 40, 60 kN



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) In Section – I, Q. No. 2 is compulsory. Solve any two from the remaining.

- 2) In Section II, solve any three questions.
- 3) **Assume** suitable data if necessary and state it **clearly**.
- 4) **Use** of non programmable scientific calculators is **allowed**.
- 5) Figures to the **right** indicate **full** marks.

SECTION - I

- 2. a) State and prove Varignon's theorem.
 - b) Determine the magnitude of the resultant of the four forces acting on a body as shown in Fig. 1. Also find its direction and position from point 'O'.

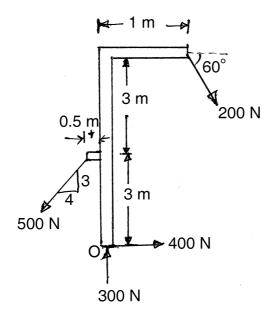


Fig. 1

4



3. a) State laws of friction.

3

b) What should be the value of θ in Fig. 2, that will make the motion of 900 kN block down the plane to impend? The coefficient of friction for all contact surfaces is $^{1}/_{3}$.

6

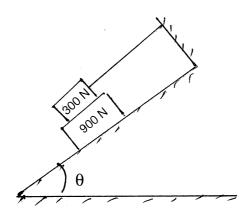


Fig. 2

4. a) State principle of virtual work.

2

b) Analyse the following truss and find forces in any four members. Use any method.

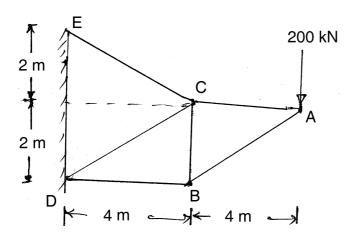


Fig. 3



5. a) Define polar moment of inertia.

- 2
- b) Determine the moment of inertia of the shaded area as shown in fig. 4 about centroidal axis parallel to AB.

7

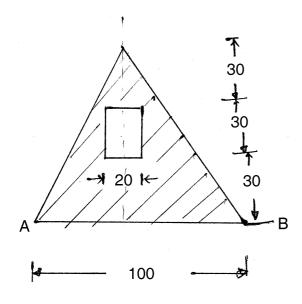


Fig. 4

SECTION - II

6. a) Define and explain concept of relative velocity.

3

- b) A stone is thrown vertically upwards with an initial velocity u. Determine
 - i) Maximum height attained by stone
 - ii) Time of flight in the air and
 - iii) The velocity with which it strikes the ground back.

7

7. a) Explain concept of dynamic equilibrium.

2

b) Two bodies of weights 15 N and 3 N are connected to the two ends of a light intensible string. Passing over a smooth pulley. The weight 15 N is placed on rough horizontal surface while the weight 3 N is hanging vertically in air. Initially the friction between the weight of 15 N and table is just sufficient to prevent motion. If additional weight of 0.5 N is added to weight 3 N. Determine



- i) The acceleration of the weights and
- ii) Tension in the string after adding weight of 0.5 N to the weight 3 N. Take $g = 9.8 \text{ m/s}^2$ for details refer Fig. 5.

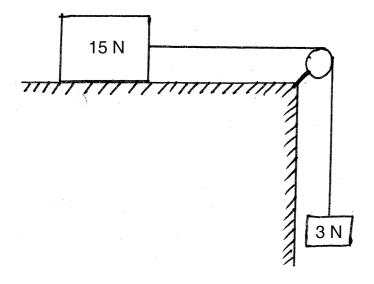


Fig. 5

8. a) Write the condition of maximum range in case of a projectile motion.

2

b) A man throws an iron ball with an initial velocity of 13 m/sec. What should be angle of projection if he has to reach a record of maximum height of 9 m from ground. Take height from which ball is released as 1.2 m.

7

9. a) Explain work-energy principle.

2

b) A body weighing 300 N is pushed up a 30° plane by 400 N force acting parallel to the plane. If the initial velocity of the body is 2 m/s and coefficient of kinetic friction is $\mu = 0.25$, what velocity will the body have after moving 5 m?

SLR-EP - 7

Seat	
No.	

Set S

F.E. (Part – I) (Old – CGPA) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

a) same

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 3) In Section I, Q. No. 2 is compulsory. Solve any two from the remaining.
- 4) In Section II, solve any three questions.
- 5) **Assume** suitable data if **necessary** and state it **clearly**.
- 6) **Use** of non programmable scientific calculators is **allowed**.

c) collinear

7) Figures to the **right** indicate **full** marks.

		MCQ/Objective T	ype Questions		
Duration	: 30 Minutes	-			Marks: 14
1. Cho	ose the correct ans	swer:			(14×1=14)
1) \	Work energy princi _l	ple relates			
;	a) force time displa	acement	b) force velocity ti	me	
	c) force displacem	ent velocity	d) force mass acc	eleration	
,	When a ball is throv particle is	vn up with a veloci	ty 'u', the maximum	n height reac	hed by
;	a) u ² /29	b) 2u ² /9	c) 2u/9	d) u/9	
, (y equation a = 2t – velocity of the part		•
	a) 2 m/s	b) 1 m/s	c) 12 m/s	d) 18 m/s	

4) Direction of velocity and acceleration in a rectilinear motion are

b) opposite

d) none of the above

5)	When body is lifted	up, work done by	force of gravity is $_$	
	a) +ve	b) zero	c) -ve	d) none
6)	If the size of the ob the problem, it may	be treated as		
	a) body	b) object	c) particle	d) matter
7)	Equilibriant isis	as th _ to that of resultar	e resultant in magni ıt.	tude but its direction
	a) twice, same		b) half, opposite	
	c) same, opposite		d) opposite, same	
8)	If a body is in equili should be	brium under the a	ction of only three f	orces, they
	a) parallel	b) concurrent	c) non-concurrent	d) colinear
9)	A simply supported reactions R_A and F		cted to point load of	100 kN at its centre
	a) 100, 100 kN	b) 50, 50 kN	c) 60, 40 kN	d) 40, 60 kN
10)	Polar moment of in-	ertia is related with	a	vic theorem
,		critic is related with	a	AIS II IEUI EI I I.
,	a) perpendicular			
·		b) parallel	c) both a) and b)	d) none
·	a) perpendicular Moment of inertia of	b) parallel	c) both a) and b) width b, about its ba	d) none
11)	a) perpendicular Moment of inertia of	b) parallel of a rectangle with b) $\frac{db^3}{12}$ e	c) both a) and b) width b, about its bacc) $\frac{bd^3}{3}$, if the number of r	d) none ase is equal to d) $\frac{db^3}{3}$
11)	a) perpendicular Moment of inertia of a) $\frac{bd^3}{12}$ A frame is said to be	b) parallel of a rectangle with b) $\frac{db^3}{12}$ e uired for a perfect f	c) both a) and b) width b, about its bacc) $\frac{bd^3}{3}$, if the number of rame.	d) none ase is equal to d) $\frac{db^3}{3}$ members in it are
11) 12)	 a) perpendicular Moment of inertia of a) bd³/12 A frame is said to be more than that requal redundant Maximum range of 	b) parallel of a rectangle with b) $\frac{db^3}{12}$ e uired for a perfect f b) deficient	c) both a) and b) width b, about its bacc) $\frac{bd^3}{3}$, if the number of rame. c) both a) and b)	d) none ase is equal to d) $\frac{db^3}{3}$ members in it are d) none
11) 12)	 a) perpendicular Moment of inertia of a) bd³/12 A frame is said to be more than that requal redundant Maximum range of 	b) parallel of a rectangle with b) $\frac{db^3}{12}$ e uired for a perfect f b) deficient projectile is obtain	c) both a) and b) width b, about its bacc) $\frac{bd^3}{3}$, if the number of rame. c) both a) and b)	d) none ase is equal to d) $\frac{db^3}{3}$ members in it are d) none
11) 12) 13)	 a) perpendicular Moment of inertia of a) bd³/12 A frame is said to be more than that requal redundant Maximum range of degree degree	b) parallel of a rectangle with b) $\frac{db^3}{12}$ e uired for a perfect f b) deficient projectile is obtaingree. b) 45	c) both a) and b) width b, about its bacc) $\frac{bd^3}{3}$, if the number of rame. c) both a) and b) led when angle of p	d) none ase is equal to d) $\frac{db^3}{3}$ members in it are d) none rojection is
11) 12) 13)	 a) perpendicular Moment of inertia of a) bd³/12 A frame is said to be more than that requal redundant Maximum range of degral and degral a	b) parallel of a rectangle with b) $\frac{db^3}{12}$ e uired for a perfect f b) deficient projectile is obtaingree. b) 45	c) both a) and b) width b, about its bacc) $\frac{bd^3}{3}$, if the number of rame. c) both a) and b) led when angle of p	d) none ase is equal to d) $\frac{db^3}{3}$ members in it are d) none rojection is d) 30 ins constant?
11) 12) 13)	a) perpendicular Moment of inertia of a) bd³/12 A frame is said to be more than that requal redundant Maximum range of degree a) 90 In projectile motion	b) parallel of a rectangle with b) $\frac{db^3}{12}$ e uired for a perfect f b) deficient projectile is obtain gree. b) 45 , which of the follow	c) both a) and b) width b, about its bacc) bd3/3 _, if the number of reframe. c) both a) and b) led when angle of p c) 75 wing quantity rema	d) none ase is equal to d) $\frac{db^3}{3}$ members in it are d) none rojection is d) 30 ins constant? of velocity



Seat	
No.	

F.E. (Part – I) (Old – CGPA) Examination, 2016 APPLIED MECHANICS

Day and Date: Wednesday, 14-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) In Section – I, Q. No. 2 is compulsory. Solve any two from the remaining.

- 2) In Section II, solve any three questions.
- 3) **Assume** suitable data if necessary and state it **clearly**.
- 4) **Use** of non programmable scientific calculators is **allowed**.
- 5) Figures to the **right** indicate **full** marks.

SECTION - I

- 2. a) State and prove Varignon's theorem.
 - b) Determine the magnitude of the resultant of the four forces acting on a body as shown in Fig. 1. Also find its direction and position from point 'O'.

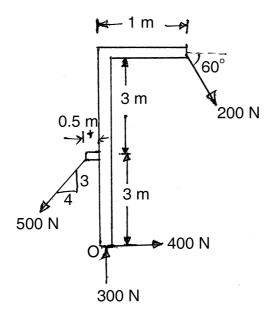


Fig. 1

4



3. a) State laws of friction.

3

b) What should be the value of θ in Fig. 2, that will make the motion of 900 kN block down the plane to impend? The coefficient of friction for all contact surfaces is $^{1}/_{3}$.

6

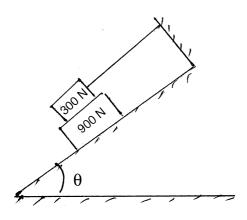


Fig. 2

4. a) State principle of virtual work.

2

b) Analyse the following truss and find forces in any four members. Use any method.

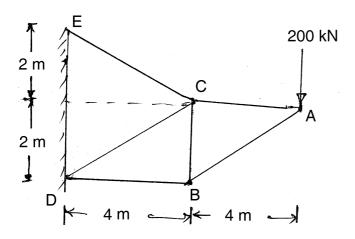


Fig. 3



- 5. a) Define polar moment of inertia.
 - b) Determine the moment of inertia of the shaded area as shown in fig. 4 about centroidal axis parallel to AB.

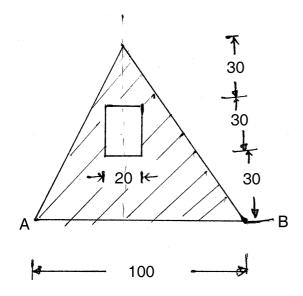


Fig. 4

SECTION - II

- 6. a) Define and explain concept of relative velocity.
 - b) A stone is thrown vertically upwards with an initial velocity u. Determine
 - i) Maximum height attained by stone
 - ii) Time of flight in the air and
 - iii) The velocity with which it strikes the ground back.

7. a) Explain concept of dynamic equilibrium.

b) Two bodies of weights 15 N and 3 N are connected to the two ends of a light intensible string. Passing over a smooth pulley. The weight 15 N is placed on rough horizontal surface while the weight 3 N is hanging vertically in air. Initially the friction between the weight of 15 N and table is just sufficient to prevent motion. If additional weight of 0.5 N is added to weight 3 N. Determine

7

3

7



- i) The acceleration of the weights and
- ii) Tension in the string after adding weight of 0.5 N to the weight 3 N. Take $g = 9.8 \text{ m/s}^2$ for details refer Fig. 5.

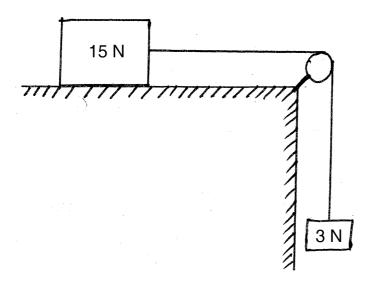


Fig. 5

8. a) Write the condition of maximum range in case of a projectile motion.

2

b) A man throws an iron ball with an initial velocity of 13 m/sec. What should be angle of projection if he has to reach a record of maximum height of 9 m from ground. Take height from which ball is released as 1.2 m.

7

9. a) Explain work-energy principle.

2

b) A body weighing 300 N is pushed up a 30° plane by 400 N force acting parallel to the plane. If the initial velocity of the body is 2 m/s and coefficient of kinetic friction is $\mu = 0.25$, what velocity will the body have after moving 5 m?

SLR-EP - 8

|--|

F.E. (Part – I) (Old CGPA) Examination, 2016 **BASIC ELECTRICAL ENGINEERING**

Day and Date : Friday, 16-12-2016	Total Marks: 70
-----------------------------------	-----------------

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 3) All questions are compulsory.

	4) Assume suitable data if necessary.5) Draw neat diagrams whenever necessary.						
	MCQ/Objective Type Questions						
Duratio	on : 30 Minutes			Marks : 1	4		
1. CI	hoose the correct ans	wer:		(14×1=14	I)		
1) What percentage o	f the maximum pov	ver is delivered to a l	oad if load resistance			
	is 10 times greate	r than the Theveni	ns resistance of the	e source to which it is			
	connected ?						
	a) 25%	b) 50%	c) 35%	d) 33.06%			
2) Three 3 Ω resistor	s are connected in	the form of equilate	ral triangle. The total			
	resistance betweer	any two corners is	3				
	a) 2Ω	b) 6Ω	c) 3Ω	d) $4/3\Omega$			
3) The commercial un	it of electrical energ	gy is				
	a) K WH	b) Joule	c) Watt-second	d) None of these			
4) A magnetizing force	e of 800 AT/m will p	produce a flux density	<i>r</i> of in air.			
	a) 1 m Wb/m ²	b) 1 Wb/m ²	c) 10 m Wb/m ²	d) 0.5 Wb/m ²			
5	i) The value of leakag	ge co-efficient for e	lectrical machines is	usually about			
	a) 0.5 to 1	b) 4 to 10	c) above 10	d) 1.15 to 1.25			

6)	Two sinusoidal curren	its are given by the ec	quat	ions; i1 = $10 \sin ($	ωt-	+ $\pi/3$) and i2 = 15
	sin (ω t – π /4). The μ	ohase difference bet	twe	en them is		degrees.
	a) 105	b) 75	c)	15	d)	60
7)	The r.m.s. value of	sinusoidal ac curre	ent	is equal to its v	alue	e at an angle of
	degree).				
	a) 60	b) 45	c)	20	d)	90
8)	A transformer having	g 1000 primary turns	is	connected to a 25	50 V	ac supply. For a
	secondary voltage o	of 400 V, the number	of	secondary turns	sho	uld be
	a) 1600	b) 400	c)	250	d)	1250
9)	In a balanced star of	connected system li	ne	voltages lead the	eir r	espective phase
	voltages by					
	a) 120°	b) 30°	c)	60°	d)	45°
10)	One of the character	ristics of a single pha	ase	motor is that it		
	a) is self-starting		b)	is not self-startin	g	
	c) requires one win	ding	d)	none of above		
11)	A step up transforme	er increases				
	a) power	b) current	c)	voltage	d)	frequency
12)	In purely resistive ci	rcuit the power facto	r is			
	a) zero		b)	zero leading		
	c) zero lagging		d)	none of the abov	/e	
13)	In star connected ba	alanced load				
	a) $I_L = I_{PH}$		b)	$V_L = V_{PH}$		
	c) $I_L = \sqrt{3} I_{PH}$		d)	None of the abo	ve	
14)	If the admittance of	parallel AC circuit is	inc	reased, the circui	it cu	ırrent
	a) remain constant		b)	is decreased		
	c) is increased		d)	none of the abov	/e	



Seat	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams whenever necessary.

SECTION - I

2. Attempt any four of the following:

 $(4 \times 4 = 16)$

- a) A d.c. shunt motor after running several hours on constant voltage mains 400 V takes a field current of 1.6 A. If the temperature rise is known to be 40° C, what value of extra circuit resistance is required to adjust the field current to 1.6 A when starting from cold at 20°C? Temperature coefficient = 0.0043/°C at 20° C.
- b) Write short notes on : "B-H Curve and effect on selection of Electromagnetic material".
- c) State Thevenin's theorem and explain procedure for finding current flowing through RL.
- d) Define and explain following terms:

i) Magnetic field strength

ii) Form Factor

iii) Phasor Diagram

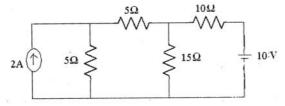
iv) Phase

- e) An electric kettle containing 0.75 liters of water raises the temperature from 30° to boiling point using 0.5 KW power from 240 V d.c. supplies. If overall efficiency is 80%, find the time required (in minutes) to raise the above temperature. Take specific heat of water as 4,200 J/kg k.
- f) The self-inductance of a coil having 500 turns is 0.25 H. If 60% of the flux is linked with a second coil of 10,000 turns, Calculate :
 - 1) Mutual Inductance of the two coil
 - 2) Emf induced in second coil when current in the first coil changes at the rate of 100 A/sec.

3. Solve any two:

 $(2\times6=12)$

a) Write the properties of series and parallel D.C. circuits. Find the current flowing through the resistance of 15 Ω .





- b) A metal ring of mean diameter of 80 cm is made out of two semi-circular pieces of cast iron and cast steel separate at a junction of pieces of copper each of 1 millimeter thickness. If the ring is uniformly wound with 100 turns, calculate the value of the current required to produce a flux density of 0.85 T in the ring. Given that relative permeability of cast iron is 200, and that of cast steel is of 1,200.
- c) Define average value and prove that average value of an alteration quantity over a complete cycle is zero.

SECTION - II

4. Solve any four: (4×4=16)

- a) Derive the expression of average power in purely resistive AC circuit.
- b) Define and explain following terms related to ac circuit:
 - 1) Impedance
- 2) Admittance
- 3) Active power
- 4) Power factor
- c) Derive an e.m.f. equation for a single phase transformer.
- d) State various applications of DC shunt and DC series motor.
- e) Derive the relationship between line and phase quantities of star connected load.
- f) With the help of waveforms and phasor diagram explain AC through series RL circuit.

5. Solve any two: (2×6=12)

- a) A single phase. 220 V/110 V, 5 KVA transformer has an efficiency of 96% on full load at unity power factor and 95% on half load at unity power factor. Determine for full load condition.
 - 1) Iron and copper loss
- 2) Efficiency at 0.8 of lagging
- b) A capacitor of 79.5 $\,\mu$ F is connected in series with a pure resistance of 30 ohm. The circuit is supplied from 100 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power factor.
- c) Three equal impedance each of 60<30° ohm are connected in delta across three phase, 400 V, 50 Hz. Supply. Calculate :
 - 1) line and phase voltage
 - 2) line and phase current
 - 3) active and reactive power.

Seat No.	t	Q
----------	---	---

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date : Friday, 16-12-2016	Total Marks : 70
-----------------------------------	------------------

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 3) All questions are compulsory.

4) Assume suitable data if necessary. 5) Draw **neat** diagrams **whenever** necessary. MCQ/Objective Type Questions **Duration: 30 Minutes** Marks: 14 1. Choose the correct answer: $(14 \times 1 = 14)$ 1) A transformer having 1000 primary turns is connected to a 250 V ac supply. For a secondary voltage of 400 V, the number of secondary turns should be a) 1600 b) 400 c) 250 d) 1250 2) In a balanced star connected system line voltages lead their respective phase voltages by a) 120° b) 30° d) 45° c) 60° 3) One of the characteristics of a single phase motor is that it a) is self-starting b) is not self-starting c) requires one winding d) none of above 4) A step up transformer increases c) voltage d) frequency a) power b) current

5) In purely resistive circuit the power factor is

a) zero b) zero leading

c) zero lagging d) none of the above



6)	In star connected ba	lanced load				
	a) $I_L = I_{PH}$		b)	$V_L = V_{PH}$		
	c) $I_L = \sqrt{3} I_{PH}$		d)	None of the above	ve	
7)	If the admittance of p	parallel AC circuit is	inc	reased, the circui	it cu	ırrent
	a) remain constant		b)	is decreased		
	c) is increased		d)	none of the abov	/e	
8)	What percentage of	the maximum powe	er is	delivered to a lo	ad i	f load resistance
	is 10 times greater	than the Thevenins	s re	sistance of the	sou	rce to which it is
	connected ?					
	a) 25%	b) 50%	c)	35%	d)	33.06%
9)	Three 3Ω resistors	are connected in the	he	form of equilatera	al tr	iangle. The total
	resistance between	any two corners is				
	a) 2Ω	b) 6Ω	c)	3Ω	d)	4/3Ω
10)	The commercial unit	of electrical energy	ı is			
	a) K WH	b) Joule	c)	Watt-second	d)	None of these
11)	A magnetizing force	of 800 AT/m will pro	odu	ce a flux density	of _	in air.
	a) 1 m Wb/m ²	b) 1 Wb/m ²	c)	10 m Wb/m ²	d)	0.5 Wb/m ²
12)	The value of leakage	e co-efficient for ele	ctri	cal machines is u	sua	lly about
	a) 0.5 to 1	b) 4 to 10	c)	above 10	d)	1.15 to 1.25
13)	Two sinusoidal curren	ts are given by the eq	quat	ions ; i1 = 10 sin (ωt-	+ π /3) and i2 = 15
	sin ($_{\odot}$ t – $_{\pi}$ /4). The p	hase difference bet	twe	en them is		degrees.
	a) 105	b) 75	c)	15	d)	60
14)	The r.m.s. value of	sinusoidal ac curre	ent	is equal to its v	alue	e at an angle of
	degree					
	a) 60	b) 45	c)	20	d)	90



Seat	
Seat	
NI.	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams whenever necessary.

SECTION - I

2. Attempt any four of the following:

 $(4 \times 4 = 16)$

- a) A d.c. shunt motor after running several hours on constant voltage mains 400 V takes a field current of 1.6 A. If the temperature rise is known to be 40° C, what value of extra circuit resistance is required to adjust the field current to 1.6 A when starting from cold at 20°C? Temperature coefficient = 0.0043/°C at 20° C.
- b) Write short notes on : "B-H Curve and effect on selection of Electromagnetic material".
- c) State Thevenin's theorem and explain procedure for finding current flowing through RL.
- d) Define and explain following terms:

i) Magnetic field strength

ii) Form Factor

iii) Phasor Diagram

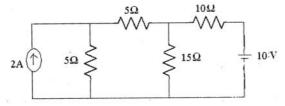
iv) Phase

- e) An electric kettle containing 0.75 liters of water raises the temperature from 30° to boiling point using 0.5 KW power from 240 V d.c. supplies. If overall efficiency is 80%, find the time required (in minutes) to raise the above temperature. Take specific heat of water as 4,200 J/kg k.
- f) The self-inductance of a coil having 500 turns is 0.25 H. If 60% of the flux is linked with a second coil of 10,000 turns, Calculate :
 - 1) Mutual Inductance of the two coil
 - 2) Emf induced in second coil when current in the first coil changes at the rate of 100 A/sec.

3. Solve any two:

 $(2\times6=12)$

a) Write the properties of series and parallel D.C. circuits. Find the current flowing through the resistance of 15 Ω .





- b) A metal ring of mean diameter of 80 cm is made out of two semi-circular pieces of cast iron and cast steel separate at a junction of pieces of copper each of 1 millimeter thickness. If the ring is uniformly wound with 100 turns, calculate the value of the current required to produce a flux density of 0.85 T in the ring. Given that relative permeability of cast iron is 200, and that of cast steel is of 1,200.
- c) Define average value and prove that average value of an alteration quantity over a complete cycle is zero.

SECTION - II

4. Solve any four: (4×4=16)

- a) Derive the expression of average power in purely resistive AC circuit.
- b) Define and explain following terms related to ac circuit:
 - 1) Impedance
- 2) Admittance
- 3) Active power
- 4) Power factor
- c) Derive an e.m.f. equation for a single phase transformer.
- d) State various applications of DC shunt and DC series motor.
- e) Derive the relationship between line and phase quantities of star connected load.
- f) With the help of waveforms and phasor diagram explain AC through series RL circuit.

5. Solve any two: (2×6=12)

- a) A single phase. 220 V/110 V, 5 KVA transformer has an efficiency of 96% on full load at unity power factor and 95% on half load at unity power factor. Determine for full load condition.
 - 1) Iron and copper loss
- 2) Efficiency at 0.8 of lagging
- b) A capacitor of 79.5 $\,\mu$ F is connected in series with a pure resistance of 30 ohm. The circuit is supplied from 100 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power factor.
- c) Three equal impedance each of 60<30° ohm are connected in delta across three phase, 400 V, 50 Hz. Supply. Calculate :
 - 1) line and phase voltage
 - 2) line and phase current
 - 3) active and reactive power.

voltages by

b) 30°

c) 60°

a) 120°

				SLR-EP – 8
Seat No.				Set R
		F.E. (Part – I) (Old CO BASIC ELECTRI	GPA) Examination, 2 CAL ENGINEERING	
-	d Date : Friday, 0.00 a.m. to 1.0			Total Marks : 70
	Instructions :	in Answer Book P. 2) Answer MCQ/Ob	age No. 3. Each quesiective type question ention, Q.P. Set (P/G compulsory. data if necessary.	lved in first 30 minutes stion carries one mark. as on Page No. 3 only. and No. 3 only. and No. 3 on Top of Page.
		MCQ/Objectiv	e Type Questions	
Duration	n : 30 Minutes			Marks: 14
1. Cho	oose the correc	t answer :		(14×1=14)
1)	The value of le	eakage co-efficient for	electrical machines is	s usually about
	a) 0.5 to 1	b) 4 to 10	c) above 10	d) 1.15 to 1.25
2)	Two sinusoidal	currents are given by the	e equations ; i1 = 10 s	in ($_{\odot}$ t + $_{\pi}$ /3) and i2 = 15
	$\sin (\omega t - \pi/4)$.	The phase difference	between them is	degrees.
	a) 105	b) 75	c) 15	d) 60
3)	The r.m.s. val	ue of sinusoidal ac o	current is equal to its	s value at an angle of
	d	egree.		
	a) 60	b) 45	c) 20	d) 90
4)	A transformer	having 1000 primary to	urns is connected to a	250 V ac supply. For a
	secondary volt	age of 400 V, the num	ber of secondary turr	ns should be
	a) 1600	b) 400	c) 250	d) 1250
5)	In a balanced	star connected syste	m line voltages lead	their respective phase

d) 45°



6)	One of the character	istics of a single pha	ase	motor is that it		
	a) is self-starting		b)	is not self-startin	g	
	c) requires one win	ding	d)	none of above		
7)	A step up transforme	er increases				
	a) power	b) current	c)	voltage	d)	frequency
8)	In purely resistive cir	cuit the power facto	r is			
	a) zero		b)	zero leading		
	c) zero lagging		d)	none of the abov	⁄e	
9)	In star connected ba	lanced load				
	a) $I_L = I_{PH}$		b)	$V_L = V_{PH}$		
	c) $I_L = \sqrt{3} I_{PH}$		d)	None of the above	ve	
0)) If the admittance of parallel AC circuit is increased, the circuit current					irrent
	a) remain constant		b)	is decreased		
	c) is increased		d)	none of the abov	⁄e	
1)	What percentage of	the maximum powe	er is	delivered to a loa	ad i	f load resistance
	is 10 times greater	than the Thevenins	s re	sistance of the	sou	rce to which it is
	connected ?					
	a) 25%	b) 50%	c)	35%	d)	33.06%
12)	Three 3Ω resistors	are connected in the	he '	form of equilatera	al tr	iangle. The total
	resistance between	any two corners is				
	a) 2Ω	b) 6Ω	c)	3Ω	d)	$4/3\Omega$
13)	The commercial unit	of electrical energy	' is			
	a) K WH	b) Joule	c)	Watt-second	d)	None of these
4)	A magnetizing force	of 800 AT/m will pro	odu	ce a flux density	of _	in air.
	a) 1 m Wb/m ²	b) 1 Wb/m ²	c)	10 m Wb/m ²	d)	0.5 Wb/m ²



Seat	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC ELECTRICAL ENGINEERING

-3-

Day and Date: Friday, 16-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams whenever necessary.

SECTION - I

2. Attempt any four of the following:

 $(4 \times 4 = 16)$

- a) A d.c. shunt motor after running several hours on constant voltage mains 400 V takes a field current of 1.6 A. If the temperature rise is known to be 40° C, what value of extra circuit resistance is required to adjust the field current to 1.6 A when starting from cold at 20°C? Temperature coefficient = 0.0043/°C at 20° C.
- b) Write short notes on : "B-H Curve and effect on selection of Electromagnetic material".
- c) State Thevenin's theorem and explain procedure for finding current flowing through RL.
- d) Define and explain following terms:

i) Magnetic field strength

ii) Form Factor

iii) Phasor Diagram

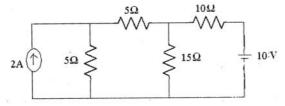
iv) Phase

- e) An electric kettle containing 0.75 liters of water raises the temperature from 30° to boiling point using 0.5 KW power from 240 V d.c. supplies. If overall efficiency is 80%, find the time required (in minutes) to raise the above temperature. Take specific heat of water as 4,200 J/kg k.
- f) The self-inductance of a coil having 500 turns is 0.25 H. If 60% of the flux is linked with a second coil of 10,000 turns, Calculate:
 - 1) Mutual Inductance of the two coil
 - 2) Emf induced in second coil when current in the first coil changes at the rate of 100 A/sec.

3. Solve any two:

 $(2\times6=12)$

a) Write the properties of series and parallel D.C. circuits. Find the current flowing through the resistance of 15 Ω .





- b) A metal ring of mean diameter of 80 cm is made out of two semi-circular pieces of cast iron and cast steel separate at a junction of pieces of copper each of 1 millimeter thickness. If the ring is uniformly wound with 100 turns, calculate the value of the current required to produce a flux density of 0.85 T in the ring. Given that relative permeability of cast iron is 200, and that of cast steel is of 1,200.
- c) Define average value and prove that average value of an alteration quantity over a complete cycle is zero.

SECTION - II

4. Solve any four: (4×4=16)

- a) Derive the expression of average power in purely resistive AC circuit.
- b) Define and explain following terms related to ac circuit:
 - 1) Impedance
- 2) Admittance
- 3) Active power
- 4) Power factor
- c) Derive an e.m.f. equation for a single phase transformer.
- d) State various applications of DC shunt and DC series motor.
- e) Derive the relationship between line and phase quantities of star connected load.
- f) With the help of waveforms and phasor diagram explain AC through series RL circuit.

5. Solve any two : (2×6=12)

- a) A single phase. 220 V/110 V, 5 KVA transformer has an efficiency of 96% on full load at unity power factor and 95% on half load at unity power factor. Determine for full load condition.
 - 1) Iron and copper loss
- 2) Efficiency at 0.8 of lagging
- b) A capacitor of 79.5 $\,\mu$ F is connected in series with a pure resistance of 30 ohm. The circuit is supplied from 100 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power factor.
- c) Three equal impedance each of 60<30° ohm are connected in delta across three phase, 400 V, 50 Hz. Supply. Calculate :
 - 1) line and phase voltage
 - 2) line and phase current
 - 3) active and reactive power.

SLR-EP - 8

	1	-	
Seat		0.4	
No.		Set	S

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC ELECTRICAL ENGINEERING

Day and Date: Friday, 16-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
 - 3) All questions are compulsory.
 - 4) Assume suitable data if necessary.
 - 5) Draw neat diagrams whenever necessary.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14 1. Choose the correct answer: $(14 \times 1 = 14)$ 1) One of the characteristics of a single phase motor is that it

- - a) is self-starting

- b) is not self-starting
- c) requires one winding
- d) none of above
- 2) A step up transformer increases
 - a) power
- b) current
- c) voltage
- d) frequency

- 3) In purely resistive circuit the power factor is
 - a) zero

b) zero leading

c) zero lagging

- d) none of the above
- 4) In star connected balanced load
 - a) $I_1 = I_{PH}$

b) $V_I = V_{PH}$

c) $I_1 = \sqrt{3} I_{PH}$

- d) None of the above
- 5) If the admittance of parallel AC circuit is increased, the circuit current
 - a) remain constant

b) is decreased

c) is increased

d) none of the above

What percentage of	the maximum power	er is delivered to a lo	ad if load resistance	
is 10 times greater	than the Thevenins	s resistance of the	source to which it is	
connected ?				
a) 25%	b) 50%	c) 35%	d) 33.06%	
Three 3Ω resistors	are connected in the	he form of equilater	al triangle. The total	
resistance between	any two corners is			
a) 2Ω	b) 6Ω	c) 3Ω	d) $4/3\Omega$	
8) The commercial unit of electrical energy is				
a) K WH	b) Joule	c) Watt-second	d) None of these	
A magnetizing force	of 800 AT/m will pro	oduce a flux density	of in air.	
a) 1 m Wb/m ²	b) 1 Wb/m ²	c) 10 m Wb/m ²	d) 0.5 Wb/m ²	
The value of leakage	e co-efficient for ele	ctrical machines is u	sually about	
a) 0.5 to 1	b) 4 to 10	c) above 10	d) 1.15 to 1.25	
			() (0) 1:0 45	
I wo sinusoidal curren	ts are given by the ec	quations; i1 = 10 sin ($(\omega t + \pi/3)$ and $i2 = 15$	
I wo sinusoidal curren $\sin (\omega t - \pi/4). \text{ The } \mu$	_			
	_			
sin (ω t – π /4). The μ	bhase difference be	tween them is	degrees.	
sin $(\omega t - \pi/4)$. The μ a) 105	bhase difference bet b) 75 sinusoidal ac curre	tween them is	degrees.	
sin $(\omega t - \pi/4)$. The μ a) 105 The r.m.s. value of	bhase difference bet b) 75 sinusoidal ac curre	tween them is	degrees.	
sin (ω t - π /4). The μ a) 105 The r.m.s. value of degree	bhase difference bef b) 75 sinusoidal ac curre b) 45	tween them is c) 15 ent is equal to its v c) 20	degrees. d) 60 value at an angle of d) 90	
sin ($_{\odot}$ t - $_{\pi}$ /4). The parameters a) 105 The r.m.s. value of degree a) 60	bhase difference bef b) 75 sinusoidal ac curre b) 45 g 1000 primary turns	tween them is c) 15 ent is equal to its v c) 20 s is connected to a 25	degrees. d) 60 value at an angle of d) 90 50 V ac supply. For a	
sin ($_{\odot}$ t - $_{\pi}$ /4). The parameters a) 105 The r.m.s. value of degree a) 60 A transformer having	bhase difference bef b) 75 sinusoidal ac curre b) 45 g 1000 primary turns	tween them is c) 15 ent is equal to its v c) 20 s is connected to a 25	degrees. d) 60 value at an angle of d) 90 50 V ac supply. For a	
sin ($_{\odot}$ t - $_{\pi}$ /4). The parameters a) 105 The r.m.s. value of degree a) 60 A transformer having secondary voltage of	bhase difference before by 75 sinusoidal ac curre b) 45 g 1000 primary turns f 400 V, the number b) 400	tween them is c) 15 ent is equal to its v c) 20 s is connected to a 25 r of secondary turns a c) 250	degrees. d) 60 ralue at an angle of d) 90 50 V ac supply. For a should be d) 1250	
sin ($_{\odot}$ t - $_{\pi}$ /4). The parameters a) 105 The r.m.s. value of degree a) 60 A transformer having secondary voltage of a) 1600	bhase difference before by 75 sinusoidal ac curre b) 45 g 1000 primary turns f 400 V, the number b) 400	tween them is c) 15 ent is equal to its v c) 20 s is connected to a 25 r of secondary turns a c) 250	degrees. d) 60 ralue at an angle of d) 90 50 V ac supply. For a should be d) 1250	
sin (₀ t – π/4). The p a) 105 The r.m.s. value of degree a) 60 A transformer having secondary voltage of a) 1600 In a balanced star of	bhase difference before by 75 sinusoidal ac curre b) 45 g 1000 primary turns f 400 V, the number b) 400	tween them is c) 15 ent is equal to its v c) 20 s is connected to a 25 r of secondary turns a c) 250	degrees. d) 60 ralue at an angle of d) 90 50 V ac supply. For a should be d) 1250	
	connected ? a) 25% Three 3Ω resistors resistance between a) 2Ω The commercial unit a) K WH A magnetizing force a) 1 m Wb/m ² The value of leakage a) 0.5 to 1	connected ? a) 25% b) 50% Three 3Ω resistors are connected in the resistance between any two corners is a) 2Ω b) 6Ω The commercial unit of electrical energy a) K WH b) Joule A magnetizing force of 800 AT/m will produce a) 1 m Wb/m² b) 1 Wb/m² The value of leakage co-efficient for electrical energy b) 1 wb/m²	a) 25% b) 50% c) 35% Three 3 Ω resistors are connected in the form of equilater resistance between any two corners is a) 2 Ω b) 6 Ω c) 3 Ω The commercial unit of electrical energy is a) K WH b) Joule c) Watt-second A magnetizing force of 800 AT/m will produce a flux density a) 1 m Wb/m² b) 1 Wb/m² c) 10 m Wb/m² The value of leakage co-efficient for electrical machines is a	

Seat No.

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC ELECTRICAL ENGINEERING

-3-

Day and Date: Friday, 16-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

2) Assume suitable data if necessary.

3) Draw neat diagrams whenever necessary.

SECTION - I

2. Attempt any four of the following:

 $(4 \times 4 = 16)$

- a) A d.c. shunt motor after running several hours on constant voltage mains 400 V takes a field current of 1.6 A. If the temperature rise is known to be 40° C, what value of extra circuit resistance is required to adjust the field current to 1.6 A when starting from cold at 20°C? Temperature coefficient = 0.0043/°C at 20° C.
- b) Write short notes on : "B-H Curve and effect on selection of Electromagnetic material".
- c) State Thevenin's theorem and explain procedure for finding current flowing through
- d) Define and explain following terms:

i) Magnetic field strength

ii) Form Factor

iii) Phasor Diagram

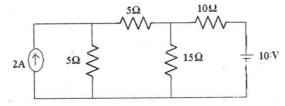
iv) Phase

- e) An electric kettle containing 0.75 liters of water raises the temperature from 30° to boiling point using 0.5 KW power from 240 V d.c. supplies. If overall efficiency is 80%, find the time required (in minutes) to raise the above temperature. Take specific heat of water as 4,200 J/kg k.
- f) The self-inductance of a coil having 500 turns is 0.25 H. If 60% of the flux is linked with a second coil of 10,000 turns, Calculate:
 - 1) Mutual Inductance of the two coil
 - 2) Emf induced in second coil when current in the first coil changes at the rate of 100 A/sec.

3. Solve any two:

 $(2\times6=12)$

a) Write the properties of series and parallel D.C. circuits. Find the current flowing through the resistance of 15 Ω .





- b) A metal ring of mean diameter of 80 cm is made out of two semi-circular pieces of cast iron and cast steel separate at a junction of pieces of copper each of 1 millimeter thickness. If the ring is uniformly wound with 100 turns, calculate the value of the current required to produce a flux density of 0.85 T in the ring. Given that relative permeability of cast iron is 200, and that of cast steel is of 1,200.
- c) Define average value and prove that average value of an alteration quantity over a complete cycle is zero.

SECTION - II

4. Solve any four: (4×4=16)

- a) Derive the expression of average power in purely resistive AC circuit.
- b) Define and explain following terms related to ac circuit:
 - 1) Impedance
- 2) Admittance
- 3) Active power
- 4) Power factor
- c) Derive an e.m.f. equation for a single phase transformer.
- d) State various applications of DC shunt and DC series motor.
- e) Derive the relationship between line and phase quantities of star connected load.
- f) With the help of waveforms and phasor diagram explain AC through series RL circuit.

5. Solve any two: (2×6=12)

- a) A single phase. 220 V/110 V, 5 KVA transformer has an efficiency of 96% on full load at unity power factor and 95% on half load at unity power factor. Determine for full load condition.
 - 1) Iron and copper loss
- 2) Efficiency at 0.8 of lagging
- b) A capacitor of 79.5 $\,\mu$ F is connected in series with a pure resistance of 30 ohm. The circuit is supplied from 100 V, 50 Hz. Source find
 - 1) Impedance
 - 2) Current flowing through circuit
 - 3) Power factor.
- c) Three equal impedance each of 60<30° ohm are connected in delta across three phase, 400 V, 50 Hz. Supply. Calculate :
 - 1) line and phase voltage
 - 2) line and phase current
 - 3) active and reactive power.

Seat		
No.	Set	P
		1 -

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 6) Q. No. 2 and Q. No. 4 are Short Answer Type Question.
- 7) Q. 3 and Q. 5 are Long Answer Type Question.
- 8) **Use** of log tables and non-programmable single memory calculator is **allowed**.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(14 \times 1 = 14)$

- 1) Change in Heat or Work is
 - A) Exact Differentials
 - B) Inexact Differentials
 - C) Partial Differentials
 - D) None of these
- 2) During a cycle Heat Transfer are given by + 120 KJ, 60 KJ, 12 KJ, 48 KJ what is the net work transfer in the cycle ?
 - A) 60000 Nm

B) 24000 Nm

C) 12000 Nm

- D) 24 Nm
- 3) Specific Heat is the amount of heat required to raise the temperature
 - A) By unit degree of substance
 - B) By unit degree of unit mass
 - C) By 10 degree of unit mass
 - D) None of the above

4)	PMM-1 is impossible according to A) Zeroth law of thermodynamics B) First law of thermodynamics C) Second law of thermodynamics D) Boyles law	law.
5)	Cadmium or Boron are used as a A) Fuel rod C) Control rod	in Nuclear reactor. B) Moderator D) None of these
6)	For Medium head and Medium discha A) Impulse turbine C) Kaplan turbine	arge the turbine used is B) Francis turbine D) None of these
7)	Compressed air is used for A) Pneumatic drills C) Spray painting	B) Inflation of automobile tires D) All of these
8)	The process of removing material fro A) Chamfering C) Turning	m face of work piece is called B) Knurling D) Facing
9)	Compression ratio of diesel engine is A) 3 to 6 B) 16 to 22	C) 5 to 8 D) 23 to 30
10)	Method of joining of two work pieces of A) Welding C) Soldering	f two dissimilar material's above 450° C B) Brazing D) All of these
11)	Otto cycle is known as A) Constant Pressure Cycle C) Constant Temperature Cycle	B) Constant Volume Cycle D) None of these
12)	The velocity ratio transmitted betwee A) $N_2/N_1 = d_2/d_1$ C) $N_2/N_1 = d_1+d_2$	n two shafts is given by B) $N_2/N_1 = d_1/d_2$ D) $N_2/N_1 = d_1 \times d_2$
13)	Stress is directly proportional to strai A) Modulus of elasticity C) Both (A) and (B)	n is called as B) Young's Modulus D) None of these
14)	gears connect two nor are usually at right angles. A) Spur C) Worm and Worm Wheel	n-parallel, non-intersecting shafts which B) Bevel D) None of these



Seat	
No.	

F.E. (Part - I) (Old CGPA) Examination, 2016 **BASIC MECHANICAL ENGINEERING**

Day and Date: Monday, 19-12-2016 Marks: 56 Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions, if necessary and mention them clearly.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 2 and Q. No. 4 are Short Answer Question.
- 5) Q. 3 and Q. 5 are Long Answer Type Question.
- 6) Use of log tables and non-programmable single memory calculator is allowed.

SECTION-I

2.	Attempt any five of the following:	15
	a) What is difference between Heat and Work?	3
	b) State the type of system for following :	3
	i) Car Engine ii) Domestic Refrigerator.	
	c) What is an ideal gas? Derive characteristic equation of gas.	3
	d) What is difference between reciprocating and centrifugal pump?	3
	e) Explain first law for a closed system undergoing a cycle.	3
	f) What are the function of following units in Thermal power plant?i) Condenserii) Economizeriii) Air preheater	3
	g) Write a note on thermodynamic state and cycle.	3
3.	Attempt any three of the following:	13
	 a) Fluid enters the nozzle with a velocity of 3300 m/min and the enthalpy of fluid at the exit of nozzle is 2700 KJ/Kg the nozzle is placed horizontal. Neglecting the heat loss in the nozzle determine, i) Velocity of fluid at exit ? 	
	ii) The mass flow rate at the inlet of the nozzle if the inlet area is 0.095 m ² and specific volume at the inlet is 0.19 m ³ /kg.	
	iii) The exit area of the nozzle if the specific volume at exit is 0.5 m ³ /kg.	5
	b) Explain with neat sketch working of hydroelectric power plant.	4
	c) Explain with neat sketch working of Impulse Turbine.	4
	Se	et P

- d) 0.1 m³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m³. Calculate the final pressure of the gas and heat supplied during the process.
- e) A cycle consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the net work of the cycle.

Process	Q(KW)	W(KW)	ΔU(KW)
1-2	40	_	25
2-3	20	-10	_
3 – 4	-20	_	_
4 – 1	0	8	_

SECTION - II

4. Attempt any five of the following: 15 a) Explain Otto cycle with P-V and T-S diagram. 3 b) Discuss in brief Slip and Creep in belt drive. 3 3 c) What do you mean by Mechanical Design? Discuss need of Design. 3 d) Difference between open belt drive and cross belt drive. e) Write short note on Brazing Process. 3 3 f) Define: i) Malleability ii) Ductility iii) Hardness g) Enlist advantages and limitations of Gas welding. 3 5. Attempt any three of the following: 13 a) A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of stroke. Find the air standard efficiency of the engine. Take γ as 1.4. 4 b) Explain with neat sketch Pillar Drilling Machine. 4 c) Explain working of two stroke petrol engine with neat sketch. 4 d) Two parallel shafts, whose center lines are 4.8 m apart, are connected by an open belt drive. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1.05 m. The inlet tension in the belt when stationary is 3 KN. The mass at the belt is 1.5 kg/m length. The coefficient of friction between the belt and pulley is 0.3. Taking centrifugal tension in to account, calculate the power transmitted when the smaller pulley rotates at 400 rpm. 5

|--|

Seat		
No.	Set	Q
		—

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 6) Q. No. 2 and Q. No. 4 are Short Answer Type Question.
- 7) Q. 3 and Q. 5 are Long Answer Type Question.
- 8) **Use** of log tables and non-programmable single memory calculator is **allowed**.

MCQ/Object	ctive Type Questions
Duration: 30 Minutes	Marks : 14
1. Choose the correct answer:	(14×1=14)
1) The process of removing mateA) ChamferingC) Turning	rial from face of work piece is called B) Knurling D) Facing
2) Compression ratio of diesel engage A) 3 to 6 B) 16 to 22	gine is C) 5 to 8 D) 23 to 30
3) Method of joining of two work piA) WeldingC) Soldering	eces of two dissimilar material's above 450° C B) Brazing D) All of these
4) Otto cycle is known asA) Constant Pressure CycleC) Constant Temperature Cycl	B) Constant Volume Cycle e D) None of these
5) The velocity ratio transmitted by A) $N_2/N_1 = d_2/d_1$ C) $N_2/N_1 = d_1+d_2$	etween two shafts is given by B) $N_2/N_1 = d_1/d_2$ D) $N_2/N_1 = d_1 \times d_2$

C) Both (A) and (B)	B) Young's ModulusD) None of these
are usually at right angles.	n-parallel, non-intersecting shafts which
C) Worm and Worm Wheel	B) Bevel D) None of these
Change in Heat or Work is A) Exact Differentials B) Inexact Differentials C) Partial Differentials D) None of these	
what is the net work transfer in the cy A) 60000 Nm	en by + 120 KJ, - 60 KJ, 12 KJ, - 48 KJ ycle ? B) 24000 Nm D) 24 Nm
A) By unit degree of substanceB) By unit degree of unit massC) By 10 degree of unit mass	equired to raise the temperature
A) Zeroth law of thermodynamicsB) First law of thermodynamicsC) Second law of thermodynamics	law.
Cadmium or Boron are used as a A) Fuel rod C) Control rod	in Nuclear reactor. B) Moderator D) None of these
For Medium head and Medium discha A) Impulse turbine C) Kaplan turbine	arge the turbine used is B) Francis turbine D) None of these
Compressed air is used for A) Pneumatic drills C) Spray painting	B) Inflation of automobile tiresD) All of these

01	
Seat	
NIA	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 19-12-2016 Marks : 56

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Neat diagrams must be drawn whenever necessary.
 - 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
 - 3) Figures to the **right** indicate **full** marks.
 - 4) Q. No. 2 and Q. No. 4 are Short Answer Question.
 - 5) Q. 3 and Q. 5 are Long Answer Type Question.
 - 6) **Use** of log tables and non-programmable single memory calculator is **allowed**.

SECTION-I

2.	Attempt any five of the following:	15
	a) What is difference between Heat and Work?	3
	b) State the type of system for following :	3
	i) Car Engine ii) Domestic Refrigerator.	
	c) What is an ideal gas? Derive characteristic equation of gas.	3
	d) What is difference between reciprocating and centrifugal pump?	3
	e) Explain first law for a closed system undergoing a cycle.	3
	f) What are the function of following units in Thermal power plant?i) Condenserii) Economizeriii) Air preheater	3
	g) Write a note on thermodynamic state and cycle.	3
3.	Attempt any three of the following:	13
	 a) Fluid enters the nozzle with a velocity of 3300 m/min and the enthalpy of fluid at the exit of nozzle is 2700 KJ/Kg the nozzle is placed horizontal. Neglecting the heat loss in the nozzle determine, i) Velocity of fluid at exit ? ii) The mass flow rate at the inlet of the nozzle if the inlet area is 0.095 m² and specific volume at the inlet is 0.19 m³/kg. 	
	iii) The exit area of the nozzle if the specific volume at exit is 0.5 m ³ /kg.	5
	b) Explain with neat sketch working of hydroelectric power plant.	4
	c) Explain with neat sketch working of Impulse Turbine.	4
	Se	t O

- d) 0.1 m³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m³. Calculate the final pressure of the gas and heat supplied during the process.
- e) A cycle consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the net work of the cycle.

Process	Q(KW)	W(KW)	ΔU(KW)
1-2	40	_	25
2-3	20	-10	_
3 – 4	-20	_	_
4 – 1	0	8	_

SECTION - II

4. Attempt any five of the following: 15 a) Explain Otto cycle with P-V and T-S diagram. 3 b) Discuss in brief Slip and Creep in belt drive. 3 3 c) What do you mean by Mechanical Design? Discuss need of Design. 3 d) Difference between open belt drive and cross belt drive. e) Write short note on Brazing Process. 3 3 f) Define: i) Malleability ii) Ductility iii) Hardness g) Enlist advantages and limitations of Gas welding. 3 5. Attempt any three of the following: 13 a) A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of stroke. Find the air standard efficiency of the engine. Take γ as 1.4. 4 b) Explain with neat sketch Pillar Drilling Machine. 4 c) Explain working of two stroke petrol engine with neat sketch. 4 d) Two parallel shafts, whose center lines are 4.8 m apart, are connected by an open belt drive. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1.05 m. The inlet tension in the belt when stationary is 3 KN. The mass at the belt is 1.5 kg/m length. The coefficient of friction between the belt and pulley is 0.3. Taking centrifugal tension in to account, calculate the power transmitted when the smaller pulley rotates at 400 rpm. 5

Seat			
No.		Set	R
	•		1 1

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 6) Q. No. 2 and Q. No. 4 are Short Answer Type Question.
- 7) Q. 3 and Q. 5 are Long Answer Type Question.
- 8) **Use** of log tables and non-programmable single memory calculator is **allowed**.

		MCQ/Objective	e Type Que	stions	
Dui	ration : 30 Minutes	•			Marks: 14
1.	Choose the correct ar	swer:			(14×1=14)
	 Cadmium or Boron Fuel rod Control rod 	n are used as a _	B) Mode	in Nuclear reactor. erator e of these	
	2) For Medium headA) Impulse turbineC) Kaplan turbine		B) Fran	urbine used is cis turbine e of these	
	3) Compressed air isA) Pneumatic drillC) Spray painting		B) Inflat D) All of	tion of automobile tire	S
	4) The process of rerA) ChamferingC) Turning	noving material	from face o B) Knur D) Facir	ling .	
	5) Compression ration A) 3 to 6	of diesel engine B) 16 to 22	e is C) 5 to 8	B D) 23 to 3	0



6)	Method of joining of two work pieces of A) Welding C) Soldering	f two dissimilar material's above 450° C B) Brazing D) All of these
7)	Otto cycle is known as A) Constant Pressure Cycle C) Constant Temperature Cycle	
8)	The velocity ratio transmitted betwee A) $N_2/N_1 = d_2/d_1$ C) $N_2/N_1 = d_1+d_2$	n two shafts is given by B) $N_2/N_1 = d_1/d_2$ D) $N_2/N_1 = d_1 \times d_2$
9)	Stress is directly proportional to strai A) Modulus of elasticity C) Both (A) and (B)	n is called as B) Young's Modulus D) None of these
10)		-parallel, non-intersecting shafts which
	are usually at right angles. A) Spur C) Worm and Worm Wheel	B) Bevel D) None of these
11)	Change in Heat or Work is A) Exact Differentials B) Inexact Differentials C) Partial Differentials D) None of these	
12)	what is the net work transfer in the cy A) 60000 Nm	B) 24000 Nm
	C) 12000 Nm	D) 24 Nm
13)	Specific Heat is the amount of heat re A) By unit degree of substance B) By unit degree of unit mass C) By 10 degree of unit mass D) None of the above	quired to raise the temperature
14)	PMM-1 is impossible according to A) Zeroth law of thermodynamics B) First law of thermodynamics C) Second law of thermodynamics D) Boyles law	law.
		



Seat	
No.	

F.E. (Part - I) (Old CGPA) Examination, 2016 **BASIC MECHANICAL ENGINEERING**

Day and Date: Monday, 19-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Neat diagrams must be drawn whenever necessary.
 - 2) Make **suitable** assumptions, if necessary and mention them clearly.
 - 3) Figures to the **right** indicate **full** marks.
 - 4) Q. No. 2 and Q. No. 4 are Short Answer Question.
 - 5) Q. 3 and Q. 5 are Long Answer Type Question.
 - 6) Use of log tables and non-programmable single memory calculator is allowed.

SECTION-I

2.	Attempt any five of the following:	15
	a) What is difference between Heat and Work?	3
	b) State the type of system for following:	3
	i) Car Engine ii) Domestic Refrigerator.	
	c) What is an ideal gas? Derive characteristic equation of gas.	3
	d) What is difference between reciprocating and centrifugal pump?	3
	e) Explain first law for a closed system undergoing a cycle.	3
	f) What are the function of following units in Thermal power plant?i) Condenserii) Economizeriii) Air preheater	3
	g) Write a note on thermodynamic state and cycle.	3
3.	Attempt any three of the following:	13
	 a) Fluid enters the nozzle with a velocity of 3300 m/min and the enthalpy of fluid at the exit of nozzle is 2700 KJ/Kg the nozzle is placed horizontal. Neglecting the heat loss in the nozzle determine, i) Velocity of fluid at exit ? ii) The mass flow rate at the inlet of the nozzle if the inlet area is 0.095 m² 	
	and specific volume at the inlet is 0.19 m ³ /kg. iii) The exit area of the nozzle if the specific volume at exit is 0.5 m ³ /kg.	5
	b) Explain with neat sketch working of hydroelectric power plant.	4
	c) Explain with neat sketch working of Impulse Turbine.	4
	, ,	et R

4

- d) 0.1 m³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m³. Calculate the final pressure of the gas and heat supplied during the process.
- e) A cycle consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the net work of the cycle.

Process	Q(KW)	W(KW)	∆U(KW)
1-2	40	_	25
2-3	20	-10	_
3 – 4	-20	_	_
4 – 1	0	8	_

SECTION - II

4. Attempt any five of the following: 15 a) Explain Otto cycle with P-V and T-S diagram. 3 b) Discuss in brief Slip and Creep in belt drive. 3 3 c) What do you mean by Mechanical Design? Discuss need of Design. 3 d) Difference between open belt drive and cross belt drive. e) Write short note on Brazing Process. 3 3 f) Define: i) Malleability ii) Ductility iii) Hardness g) Enlist advantages and limitations of Gas welding. 3 5. Attempt any three of the following: 13 a) A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of stroke. Find the air standard efficiency of the engine. Take γ as 1.4. 4 b) Explain with neat sketch Pillar Drilling Machine. 4 c) Explain working of two stroke petrol engine with neat sketch. 4 d) Two parallel shafts, whose center lines are 4.8 m apart, are connected by an open belt drive. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1.05 m. The inlet tension in the belt when stationary is 3 KN. The mass at the belt is 1.5 kg/m length. The coefficient of friction between the belt and pulley is 0.3. Taking centrifugal tension in to account, calculate the power transmitted when the smaller pulley rotates at 400 rpm. 5

Seat			
No.		Set	9
	<u> </u>		3

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date: Monday, 19-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Neat diagrams must be drawn whenever necessary.

- 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
- 3) Figures to the **right** indicate **full** marks.
- 4) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 6) Q. No. 2 and Q. No. 4 are Short Answer Type Question.
- 7) Q. 3 and Q. 5 are Long Answer Type Question.
- 8) **Use** of log tables and non-programmable single memory calculator is **allowed**.

MCQ/Objective Type Questions

1. Choose the correct answer:	(14×1=14)
4\ \$4	 4500.0

- Method of joining of two work pieces of two dissimilar material's above 450° C
 A) Welding
 B) Brazing
 - C) Soldering D) All of these
- 2) Otto cycle is known as

Duration: 30 Minutes

- A) Constant Pressure Cycle
- B) Constant Volume Cycle
- C) Constant Temperature Cycle
- D) None of these
- 3) The velocity ratio transmitted between two shafts is given by
 - A) $N_2/N_1 = d_2/d_1$ B) $N_2/N_1 = d_1/d_2$ C) $N_2/N_1 = d_1+d_2$ D) $N_2/N_1 = d_1 \times d_2$
- 4) Stress is directly proportional to strain is called as
 - A) Modulus of elasticity
 B) Young's Modulus
 C) Both (A) and (B)
 D) None of these

Marks · 14

5)	gears connect two non-parallel, non-intersecting shafts which		
	are usually at right angles.	D١	Povol
	A) SpurC) Worm and Worm Wheel	,	Bevel None of these
6)	Change in Heat or Work is	,	
	A) Exact Differentials	,	Inexact Differentials
7)	C) Partial Differentials During a cycle Heat Transfer are give	,	None of these
,,	During a cycle Heat Transfer are give what is the net work transfer in the cy		
	A) 60000 Nm	B)	24000 Nm
ο\	C) 12000 Nm	,	24 Nm
8)	Specific Heat is the amount of heat re A) By unit degree of substance	-	-
	C) By 10 degree of unit mass		•
9)	PMM-1 is impossible according to		law.
	A) Zeroth law of thermodynamicsB) First law of thermodynamics		
	C) Second law of thermodynamics		
	D) Boyles law		
10)	Cadmium or Boron are used as a A) Fuel rod		in Nuclear reactor. Moderator
	C) Control rod	,	None of these
11)	For Medium head and Medium discha	arge	e the turbine used is
	A) Impulse turbineC) Kaplan turbine	,	Francis turbine None of these
12)	Compressed air is used for	ט)	None of these
,	A) Pneumatic drills	B)	Inflation of automobile tires
	C) Spray painting	,	All of these
13)	The process of removing material fro A) Chamfering		ace of work piece is called Knurling
	C) Turning	,	Facing
14)	Compression ratio of diesel engine is	,	-
	A) 3 to 6 B) 16 to 22	C)	5 to 8 D) 23 to 30



Seat	
No.	

F.E. (Part – I) (Old CGPA) Examination, 2016 BASIC MECHANICAL ENGINEERING

Day and Date : Monday, 19-12-2016 Marks : 56 Time : 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Neat diagrams must be drawn whenever necessary.

 2) Make suitable assumptions if necessary and mention
 - 2) Make **suitable** assumptions, if necessary and mention them **clearly**.
 - 3) Figures to the **right** indicate **full** marks.
 - 4) Q. No. 2 and Q. No. 4 are Short Answer Question.
 - 5) Q. 3 and Q. 5 are Long Answer Type Question.
 - 6) **Use** of log tables and non-programmable single memory calculator is **allowed**.

SECTION-I

2.	Attempt any five of the following:	15
	a) What is difference between Heat and Work?	3
	b) State the type of system for following :	3
	i) Car Engine ii) Domestic Refrigerator.	
	c) What is an ideal gas? Derive characteristic equation of gas.	3
	d) What is difference between reciprocating and centrifugal pump?	3
	e) Explain first law for a closed system undergoing a cycle.	3
	f) What are the function of following units in Thermal power plant?i) Condenserii) Economizeriii) Air preheater	3
	g) Write a note on thermodynamic state and cycle.	3
3.	Attempt any three of the following:	13
	 a) Fluid enters the nozzle with a velocity of 3300 m/min and the enthalpy of fluid at the exit of nozzle is 2700 KJ/Kg the nozzle is placed horizontal. Neglecting the heat loss in the nozzle determine, i) Velocity of fluid at exit ? ii) The mass flow rate at the inlet of the nozzle if the inlet area is 0.095 m² 	
	and specific volume at the inlet is 0.19 m ³ /kg. iii) The exit area of the nozzle if the specific volume at exit is 0.5 m ³ /kg.	5
	b) Explain with neat sketch working of hydroelectric power plant.	4
	c) Explain with neat sketch working of Impulse Turbine.	4
	, ,	et S
	ા અનુ કર્યા છે. આ માના માના માના માના માના માના માના મા	5L 🔾

- d) 0.1 m³ of air at a pressure of 1.5 bar is expanded isothermally to 0.5 m³.
 Calculate the final pressure of the gas and heat supplied during the process.
- e) A cycle consist of four processes, the energy transfer in each process is tabulated below. Complete the table and determine the net work of the cycle.

Process	Q(KW)	W(KW)	ΔU(KW)
1-2	40	_	25
2-3	20	-10	_
3 – 4	-20	_	_
4 – 1	0	8	_

SECTION - II

4. Attempt any five of the following: 15 a) Explain Otto cycle with P-V and T-S diagram. 3 b) Discuss in brief Slip and Creep in belt drive. 3 3 c) What do you mean by Mechanical Design? Discuss need of Design. 3 d) Difference between open belt drive and cross belt drive. e) Write short note on Brazing Process. 3 3 f) Define: i) Malleability ii) Ductility iii) Hardness g) Enlist advantages and limitations of Gas welding. 3 5. Attempt any three of the following: 13 a) A diesel engine has a compression ratio of 15 and heat addition at constant pressure takes place at 6% of stroke. Find the air standard efficiency of the engine. Take γ as 1.4. 4 b) Explain with neat sketch Pillar Drilling Machine. 4 c) Explain working of two stroke petrol engine with neat sketch. 4 d) Two parallel shafts, whose center lines are 4.8 m apart, are connected by an open belt drive. The diameter of the large pulley is 1.5 m and that of smaller pulley is 1.05 m. The inlet tension in the belt when stationary is 3 KN. The mass at the belt is 1.5 kg/m length. The coefficient of friction between the belt and pulley is 0.3. Taking centrifugal tension in to account, calculate the power transmitted when the smaller pulley rotates at 400 rpm. 5

.....

١			
•			

Seat		
No.	Set	

	•	art – II) (New CGP NGINEERING MA	A) Examination, 20 THEMATICS – II	<u> </u>
-	Date : Monday, 21-11- 0.00 a.m. to 1.00 p.m.	2016		Max. Marks: 70
	An 2) Ar fo 3) At 4) Fig	nswer Book Page No. Inswer MCQ/Objectiv Inswer to mention, Q.F	P. Set (P/Q/R/S) on To stions from each Section icate full marks.	ries one mark. Page No. 3 only. Don't op of Page.
Duration	: 30 Minutes	MCQ/Objective Ty	pe Questions	Marks : 14
 Choose the correct answer : If e^{ny²} is an integrating factor of the difference of n is 				(1×14=14)
			tial equation $\frac{dx}{dy} + xy =$	$e^{y^2/2}$, then the value
	a) -1	b) 1	c) ½	d) $-\frac{1}{2}$
2) If the differential equation $(ax^2y + 2y^2 - 7)$ value of a and b are			$dx + (x^3 + bxy - 8)dy$	= 0 is exact, then the
•	•		c) a = 4, b = 3	d) $a = 1, b = 3$
3)	The length of subnorma) a	nal to the curve y² = 4 b) 2a	ax is c) 3a	d) 4a
4)	The orthogonal traject	•	,	u) +a
,	a) $x^2 + y^2 = c$	•	-	d) $y^2 - x^2 = c$
5)	Which of the following	method is not a step	by step method?	
	a) Euler's method		b) Runge Kutta meth	od of fourth order
	c) Taylor's series me	thod	d) Euler's modified m	ethod
6)	If $\frac{dy}{dx} = x + y$ with y(0) y(0.2) is equals to	= 1 and h = 0.2, then	by Euler's method the	approximate value of
	a) 1	b) 1.2	c) 1.4	d) -1.2



- 7) To find the value of the derivatives numerically at the beginning or near to the beginning value of argument x, we use
 - a) Newton's forward difference formula
 - c) Central difference formula
- 8) The curve $x^2 y^2 = a^2$ is symmetrical
 - a) about both axes

 - c) in opposite quadrants

- b) Newton's backward difference formula
- d) Divided difference formula
- b) about only one axis
- d) none of these
- 9) The length of the arc of the curve x = f(t), $y = \phi(t)$ is

a)
$$\int_{t_1}^{t_2} \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt$$

b)
$$\int_{t_1}^{t_2} \sqrt{\frac{dx}{dt} + \frac{dy}{dt}} dt$$

c)
$$\int_{t_1}^{t_2} \left(\frac{dx}{dt} + \frac{dy}{dt} \right) dt$$

d)
$$\int_{t_1}^{t_2} \left[\left(\frac{dx}{dt} \right)^2 + \left(\frac{dy}{dt} \right)^2 \right] dt$$

- 10) $\frac{1}{4}$ $\frac{3}{4}$ is equal to
 - a) $\sqrt{2\pi}$
- b) $\sqrt{\frac{\pi}{2}}$
- c) $\sqrt{\pi}$
- d) $\sqrt{2} \pi$

- 11) Which of the following is true?
 - a) $\beta(n,m) = \beta(m,n)$

b) $\beta(m,n) = \frac{m}{m+n}$

c) $\beta(m,n) = \frac{n}{m+n}$

- d) $\beta(m,m)=0$
- 12) By changing the order $\iint_{0.0}^{a.x} f(x, y) dy dx$ is equal to
- a) $\iint_{0}^{a} f(x, y) dx dy$ b) $\iint_{0}^{x} f(x, y) dx dy$ c) $\iint_{0}^{a} f(x, y) dx dy$ d) None of these

- 13) $\int_{0}^{\frac{\pi}{2}} \int_{0}^{\frac{\pi}{2}} \int_{0}^{1} dr d\theta d\phi =$
- b) $\pi^2/4$
- c) $\pi^2/2$
- 14) If the density at any point varies as the distance of the point from the x-axis, then ρ is equal to
 - a) kxy
- b) kx
- c) ky
- d) None of these



Seat	
No.	

F.E. (Part – II) (New CGPA) Examination, 2016 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 21-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) Solve:
$$(x + y)dx + (3x + 3y - 4) dy = 0$$
.

b) Solve
$$(y \cdot \sec^2 x + \sec x \cdot \tan x) dx + (\tan x + 2y) dy = 0$$
.

c) Solve:
$$\frac{dy}{dx} + y \cdot \tan x = x^2 \cos^2(x).$$

OR

c) Solve:
$$x \cos y \frac{dy}{dx} + \sin y = x \sin^2 y$$
.

- 3. Attempt the following:
 - a) Find the orthogonal trajectories of the curve $y = x + ae^x$ where 'a' is a parameter.
 - b) Find the equation of the curve through the point (1,0) such that the length of the subnormal at any point is directly proportional to $\frac{1}{x^3}$.
 - c) The charge 'q' on the plate of a condenser of capacity C, charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{c} = V$ if q = 0 when t = 0,

then show that charge 'q' is given by
$$q = cv \left(1 - e^{-\frac{t}{RC}}\right)$$
.

- 4. Attempt the following:
 - a) Using Picard's method, find the solution of $\frac{dy}{dx} = 1 + xy$ when y(0) = 1 upto third approximation.

Set P

3

3



3

- b) Using Runge Kutta method of fourth order to find y at x = 1.1 in one step, if $\frac{dy}{dx} = x^2 + y^2$ with initial condition y(1) = 1.5.
- c) Using Euler's method, find the approximate value of y at x = 0.8, where $\frac{dy}{dx} = 1 2xy$ with y(0) = 0, taking h = 0.2.
- 5. a) Find $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$ at x = 2 and at x = 2.7 from the following data.
 - **x** : 2 2.2 2.4 2.6 2.8
 - **y** : 2 5.576 9.968 15.272 21.584
 - b) Using divided difference formula, find the value of $\frac{dy}{dx}$ at x = 9 from the following data.
 - **x** : 5 7 11 13 17
 - y: 150 392 1452 2366 5202

SECTION - II

- 6. a) Evaluate $\int_0^1 \sqrt{x \log\left(\frac{1}{x}\right)} dx$.
 - b) Evaluate $\int_{0}^{1} \sqrt{x} (1-x^2)^{\frac{1}{3}} dx$.
 - c) Prove that $\int_0^\alpha \frac{\tan^{-1}ax \tan^{-1}bx}{x} \, dx = \frac{\pi}{2} \log \left(\frac{a}{b}\right) \text{ where a is parameter.}$
- 7. a) Trace the curve $y^2(2a x) = x^3$.
 - b) Trace the curve $r = 3 \sin 2\theta$.
 - c) Show that the length of the parabola $y^2 = 4ax$ from the vertex to the end of the latus rectum

is a
$$\left[\sqrt{2} + \log(1 + \sqrt{2})\right]$$
.

Set P

- 8. a) Evaluate $\int_{0.0}^{1} e^{x+y} dy dx$.
 - b) Evaluate $\int_{0}^{a} \int_{0}^{x} \int_{0}^{\sqrt{x+y}} z \, dx \, dy \, dz$.
 - c) Change the order of integration and evaluate $\int_{1}^{2} \int_{1}^{x^2} \left(\frac{x^2}{y} \right) dx dy$.

OR

- c) Evaluate $\iint (x^2 + y^2) x dx dy$ over the positive quadrant of the circle $x^2 + y^2 = a^2$.
- 9. a) Find the area common to the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ by double integration.
 - b) The density of a uniform circular lamina of radius 'a' varies as the square of its density from a fixed point on the circumference of the circle $r = 2a \cos \theta$. Find the mass of Lamina.
 - c) Calculate by double integration the volume generated by the revolution of the cardioid $r = a(1 \cos \theta)$ about its axis of symmetry.

١			
ı			

Seat No.

Set Q

Max. Marks: 70

F.E. (Part – II) (New CGPA) Examination, 2016 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 21-11-2016

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 3) Attempt any three questions from each Section.
- 4) Figures to the right indicate full marks.
- 5) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Choose the correct answer :

(1×14=14)

- 1) The curve $x^2 y^2 = a^2$ is symmetrical
 - a) about both axes

b) about only one axis

c) in opposite quadrants

- d) none of these
- 2) The length of the arc of the curve x = f(t), $y = \phi(t)$ is

a)
$$\int_{t_1}^{t_2} \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt$$

b)
$$\int_{t_1}^{t_2} \sqrt{\frac{dx}{dt} + \frac{dy}{dt}} dt$$

c)
$$\int_{t_{a}}^{t_{2}} \left(\frac{dx}{dt} + \frac{dy}{dt} \right) dt$$

d)
$$\int_{t_4}^{t_2} \left[\left(\frac{dx}{dt} \right)^2 + \left(\frac{dy}{dt} \right)^2 \right] dt$$

3)
$$\frac{1}{4} \frac{3}{4}$$
 is equal to

a)
$$\sqrt{2\pi}$$

b)
$$\sqrt{\frac{\pi}{2}}$$

c)
$$\sqrt{\pi}$$

d)
$$\sqrt{2} \pi$$

4) Which of the following is true?

a)
$$\beta(n,m) = \beta(m,n)$$

b)
$$\beta(m,n) = \frac{\overline{m}}{\overline{m+n}}$$

c)
$$\beta(m,n) = \frac{\ln n}{\ln n}$$

d)
$$\beta(m,m)=0$$



- 5) By changing the order $\iint_{0.0}^{a.x} f(x, y) dy dx$ is equal to
- a) $\iint_{00}^{a} f(x, y) dx dy$ b) $\iint_{00}^{x} f(x, y) dx dy$ c) $\iint_{0v}^{a} f(x, y) dx dy$ d) None of these

- 6) $\int_{1}^{\frac{\pi}{2}} \int_{1}^{\frac{\pi}{2}} dr d\theta d\phi =$
 - a) π^2
- b) $\pi^2/4$ c) $\pi^2/2$
- 7) If the density at any point varies as the distance of the point from the x-axis, then ρ is equal to
 - a) kxy
- b) kx
- c) ky
- d) None of these
- 8) If e^{ny^2} is an integrating factor of the differential equation $\frac{dx}{dv} + xy = e^{y^2/2}$, then the value of n is
 - a) -1
- b) 1
- c) $\frac{1}{2}$
- 9) If the differential equation $(ax^2y + 2y^2 7)dx + (x^3 + bxy 8)dy = 0$ is exact, then the value of a and b are
 - a) a = 3, b = 4

- b) a = 3, b = 1 c) a = 4, b = 3 d) a = 1, b = 3
- 10) The length of subnormal to the curve $y^2 = 4ax$ is

- b) 2a
- d) 4a
- 11) The orthogonal trajectories of family of curve xy = a is
 - a) $x^2 + y^2 = c$
- b) $y^2 = 4ax$
- c) $x = c \cdot y$
- d) $v^2 x^2 = c$
- 12) Which of the following method is not a step by step method?
 - a) Euler's method

- b) Runge Kutta method of fourth order
- c) Taylor's series method
- d) Euler's modified method
- 13) If $\frac{dy}{dy} = x + y$ with y(0) = 1 and h = 0.2, then by Euler's method the approximate value of y(0.2) is equals to
 - a) 1

- b) 1.2
- c) 1.4
- d) -1.2
- 14) To find the value of the derivatives numerically at the beginning or near to the beginning value of argument x, we use
 - a) Newton's forward difference formula
- b) Newton's backward difference formula
- c) Central difference formula
- d) Divided difference formula



Seat	
No.	

F.E. (Part – II) (New CGPA) Examination, 2016 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 21-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) Solve:
$$(x + y)dx + (3x + 3y - 4) dy = 0$$
.

b) Solve
$$(y \cdot \sec^2 x + \sec x \cdot \tan x) dx + (\tan x + 2y) dy = 0$$
.

c) Solve:
$$\frac{dy}{dx} + y \cdot \tan x = x^2 \cos^2(x).$$

OR

c) Solve:
$$x \cos y \frac{dy}{dx} + \sin y = x \sin^2 y$$
.

- 3. Attempt the following:
 - a) Find the orthogonal trajectories of the curve $y = x + ae^x$ where 'a' is a parameter.
 - b) Find the equation of the curve through the point (1, 0) such that the length of the subnormal at any point is directly proportional to $\frac{1}{x^3}$.
 - c) The charge 'q' on the plate of a condenser of capacity C, charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{c} = V$ if q = 0 when t = 0,

then show that charge 'q' is given by
$$q = cv \left(1 - e^{-\frac{t}{RC}}\right)$$
.

- 4. Attempt the following:
 - a) Using Picard's method, find the solution of $\frac{dy}{dx} = 1 + xy$ when y(0) = 1 upto third approximation.

Set Q

3

3



3

- b) Using Runge Kutta method of fourth order to find y at x = 1.1 in one step, if $\frac{dy}{dx} = x^2 + y^2$ with initial condition y(1) = 1.5.
- c) Using Euler's method, find the approximate value of y at x = 0.8, where $\frac{dy}{dx} = 1 2xy$ with y(0) = 0, taking h = 0.2.
- 5. a) Find $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$ at x = 2 and at x = 2.7 from the following data.
 - **x** : 2 2.2 2.4 2.6 2.8
 - **y** : 2 5.576 9.968 15.272 21.584
 - b) Using divided difference formula, find the value of $\frac{dy}{dx}$ at x = 9 from the following data.
 - **x** : 5 7 11 13 17
 - y: 150 392 1452 2366 5202

SECTION - II

- 6. a) Evaluate $\int_0^1 \sqrt{x \log\left(\frac{1}{x}\right)} dx$.
 - b) Evaluate $\int_{0}^{1} \sqrt{x} (1-x^2)^{\frac{1}{3}} dx$.
 - c) Prove that $\int_0^\alpha \frac{\tan^{-1}ax \tan^{-1}bx}{x} \, dx = \frac{\pi}{2} \log \left(\frac{a}{b}\right) \text{ where a is parameter.}$
- 7. a) Trace the curve $y^2(2a x) = x^3$.
 - b) Trace the curve $r = 3 \sin 2\theta$.
 - c) Show that the length of the parabola $y^2 = 4ax$ from the vertex to the end of the latus rectum is a $\left[\sqrt{2} + \log(1 + \sqrt{2})\right]$.



- 8. a) Evaluate $\int_{0.0}^{1} e^{x+y} dy dx$.
 - b) Evaluate $\int_{0}^{a} \int_{0}^{x} \int_{0}^{\sqrt{x+y}} z \, dx \, dy \, dz$.
 - c) Change the order of integration and evaluate $\int_{1}^{2} \int_{1}^{x^2} \left(\frac{x^2}{y} \right) dx dy$.

OR

- c) Evaluate $\int \int (x^2 + y^2) x \, dx \, dy$ over the positive quadrant of the circle $x^2 + y^2 = a^2$.
- 9. a) Find the area common to the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ by double integration.
 - b) The density of a uniform circular lamina of radius 'a' varies as the square of its density from a fixed point on the circumference of the circle $r = 2a \cos \theta$. Find the mass of Lamina.
 - c) Calculate by double integration the volume generated by the revolution of the cardioid $r = a(1 \cos \theta)$ about its axis of symmetry.

Set R

F.E. (Part – II) (New CGPA) Examination, 2016 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 21-11-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 3) Attempt any three questions from each Section.
- 4) Figures to the right indicate full marks.
- 5) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration : 30 Minutes

Marks : 14

1. Choose the correct answer : (1×14=14)

- 1) Which of the following method is not a step by step method?
 - a) Euler's method

- b) Runge Kutta method of fourth order
- c) Taylor's series method
- d) Euler's modified method
- 2) If $\frac{dy}{dx} = x + y$ with y(0) = 1 and h = 0.2, then by Euler's method the approximate value of y(0.2) is equals to
 - a) 1

- b) 1.2
- c) 1.4
- d) -1.2
- 3) To find the value of the derivatives numerically at the beginning or near to the beginning value of argument x, we use
 - a) Newton's forward difference formula
- b) Newton's backward difference formula
- c) Central difference formula
- d) Divided difference formula
- 4) The curve $x^2 v^2 = a^2$ is symmetrical
 - a) about both axes

b) about only one axis

c) in opposite quadrants

- d) none of these
- 5) The length of the arc of the curve x = f(t), $y = \phi(t)$ is

a)
$$\int_{t_1}^{t_2} \sqrt{\left(\frac{dx}{dt}\right)^2 + \left(\frac{dy}{dt}\right)^2} dt$$

b)
$$\int_{t_1}^{t_2} \sqrt{\frac{dx}{dt} + \frac{dy}{dt}} dt$$

c)
$$\int_{t_1}^{t_2} \left(\frac{dx}{dt} + \frac{dy}{dt} \right) dt$$

d)
$$\int_{t_1}^{t_2} \left[\left(\frac{dx}{dt} \right)^2 + \left(\frac{dy}{dt} \right)^2 \right] dt$$



- 6) $\frac{1}{4} \frac{3}{4}$ is equal to
 - a) $\sqrt{2\pi}$
- b) $\sqrt{\frac{\pi}{2}}$
- c) $\sqrt{\pi}$ d) $\sqrt{2} \pi$
- 7) Which of the following is true?
 - a) $\beta(n,m) = \beta(m,n)$

b) $\beta(m,n) = \frac{\overline{m}}{\overline{m + n}}$

c) $\beta(m,n) = \frac{\ln n}{\ln n}$

- d) $\beta(m,m)=0$
- 8) By changing the order $\iint_{0.0}^{a.x} f(x, y) dy dx$ is equal to
 - a) $\iint_{0.0}^{a} f(x, y) dx dy$ b) $\iint_{0.0}^{x} f(x, y) dx dy$ c) $\iint_{0}^{a} f(x, y) dx dy$ d) None of these

- 9) $\int_{0}^{\frac{\pi}{2}} \int_{0}^{\frac{\pi}{2}} \int_{0}^{1} dr d\theta d\phi =$
- b) $\pi^2/4$ c) $\pi^2/2$
- 10) If the density at any point varies as the distance of the point from the x-axis, then ρ is equal to
 - a) kxy
- b) kx
- c) ky
- d) None of these
- 11) If e^{ny^2} is an integrating factor of the differential equation $\frac{dx}{dy} + xy = e^{\frac{y^2}{2}}$, then the value of n is
 - a) -1
- c) $\frac{1}{2}$
- 12) If the differential equation $(ax^2y + 2y^2 7)dx + (x^3 + bxy 8)dy = 0$ is exact, then the value of a and b are
 - a) a = 3, b = 4
- b) a = 3, b = 1
- c) a = 4, b = 3 d) a = 1, b = 3
- 13) The length of subnormal to the curve $y^2 = 4ax$ is
 - a) a

- b) 2a
- c) 3a
- d) 4a
- 14) The orthogonal trajectories of family of curve xy = a is
 - a) $x^2 + y^2 = c$ b) $y^2 = 4ax$
- c) $x = c \cdot y$
- d) $v^2 x^2 = c$



Seat	
No.	

F.E. (Part – II) (New CGPA) Examination, 2016 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 21-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the **right** indicate **full** marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) Solve: (x + y)dx + (3x + 3y - 4) dy = 0.

b) Solve
$$(y \cdot \sec^2 x + \sec x \cdot \tan x) dx + (\tan x + 2y) dy = 0$$
.

c) Solve:
$$\frac{dy}{dx} + y \cdot \tan x = x^2 \cos^2(x).$$

OR

c) Solve:
$$x \cos y \frac{dy}{dx} + \sin y = x \sin^2 y$$
.

- 3. Attempt the following:
 - a) Find the orthogonal trajectories of the curve $y = x + ae^x$ where 'a' is a parameter.
 - b) Find the equation of the curve through the point (1,0) such that the length of the subnormal at any point is directly proportional to $\frac{1}{x^3}$.
 - c) The charge 'q' on the plate of a condenser of capacity C, charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{c} = V$ if q = 0 when t = 0,

then show that charge 'q' is given by
$$q = cv \left(1 - e^{-\frac{t}{RC}}\right)$$
.

- 4. Attempt the following:
 - a) Using Picard's method, find the solution of $\frac{dy}{dx} = 1 + xy$ when y(0) = 1 upto third approximation.

Set R

3

3



3

- b) Using Runge Kutta method of fourth order to find y at x = 1.1 in one step, if $\frac{dy}{dx} = x^2 + y^2$ with initial condition y(1) = 1.5.
- c) Using Euler's method, find the approximate value of y at x = 0.8, where $\frac{dy}{dx} = 1 2xy$ with y(0) = 0, taking h = 0.2.
- 5. a) Find $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$ at x = 2 and at x = 2.7 from the following data.
 - **x** : 2 2.2 2.4 2.6 2.8
 - **y** : 2 5.576 9.968 15.272 21.584
 - b) Using divided difference formula, find the value of $\frac{dy}{dx}$ at x = 9 from the following data.
 - **x** : 5 7 11 13 17
 - y: 150 392 1452 2366 5202

SECTION - II

- 6. a) Evaluate $\int_0^1 \sqrt{x \log\left(\frac{1}{x}\right)} dx$.
 - b) Evaluate $\int_{0}^{1} \sqrt{x} (1-x^2)^{\frac{1}{3}} dx$.
 - c) Prove that $\int_0^\alpha \frac{\tan^{-1}ax \tan^{-1}bx}{x} \, dx = \frac{\pi}{2} \log \left(\frac{a}{b}\right) \text{ where a is parameter.}$
- 7. a) Trace the curve $y^2(2a x) = x^3$.
 - b) Trace the curve $r = 3 \sin 2\theta$.
 - c) Show that the length of the parabola $y^2 = 4ax$ from the vertex to the end of the latus rectum is a $\left[\sqrt{2} + \log(1 + \sqrt{2})\right]$.

Set R



- 8. a) Evaluate $\int_{0.0}^{1} e^{x+y} dy dx$.
 - b) Evaluate $\int_{0}^{a} \int_{0}^{x} \int_{0}^{\sqrt{x+y}} z \, dx \, dy \, dz$.
 - c) Change the order of integration and evaluate $\int_{1}^{2} \int_{1}^{x^2} \left(\frac{x^2}{y}\right) dx dy$.

OR

- c) Evaluate $\iint (x^2 + y^2) x dx dy$ over the positive quadrant of the circle $x^2 + y^2 = a^2$.
- 9. a) Find the area common to the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ by double integration.
 - b) The density of a uniform circular lamina of radius 'a' varies as the square of its density from a fixed point on the circumference of the circle $r = 2a \cos \theta$. Find the mass of Lamina.
 - c) Calculate by double integration the volume generated by the revolution of the cardioid $r = a(1 \cos \theta)$ about its axis of symmetry.

|--|--|--|--|

Seat	
No.	

Max. Marks: 70

F.E. (Part – II) (New CGPA) Examination, 2016 **ENGINEERING MATHEMATICS-II**

Day and Date : Monday, 21-11-2016

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 3) Attempt any three questions from each Section.
- 4) Figures to the **right** indicate **full** marks.
- 5) Use of calculator is allowed.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

 $(1 \times 14 = 14)$

1)
$$\left[\frac{1}{4}\right] \left[\frac{3}{4}\right]$$
 is equal to

a)
$$\sqrt{2\pi}$$

b)
$$\sqrt{\frac{\pi}{2}}$$

c)
$$\sqrt{\pi}$$

c)
$$\sqrt{\pi}$$
 d) $\sqrt{2} \pi$

2) Which of the following is true?

a)
$$\beta(n,m) = \beta(m,n)$$

b)
$$\beta(m,n) = \frac{\overline{m}}{\overline{m+n}}$$

c)
$$\beta(m,n) = \frac{\ln n}{\ln n}$$

d)
$$\beta(m,m) = 0$$

3) By changing the order $\iint_{0.0}^{a} f(x, y) dy dx$ is equal to

a)
$$\int_{0.0}^{a} f(x, y) dx dy$$
 b) $\int_{0.0}^{x} f(x, y) dx dy$ c) $\int_{0.0}^{a} f(x, y) dx dy$ d) None of these

b)
$$\iint_{0}^{x} f(x, y) dx dy$$

c)
$$\iint_{0}^{a} f(x, y) dx dy$$

4)
$$\int_{0}^{\frac{\pi}{2}} \int_{0}^{\frac{\pi}{2}} \int_{0}^{1} dr d\theta d\phi =$$

a)
$$\pi^2$$

b)
$$\pi^{2}/4$$

b)
$$\pi^2/4$$
 c) $\pi^2/2$



·Eŀ	7-10	-2	?-	
5)	If the density at any po	oint varies as the di	istance of the point fror	m the x-axis, then ρ is
	a) kxy	b) kx	c) ky	d) None of these
6)	If e ^{ny²} is an integrating of n is	g factor of the differe	ential equation $\frac{dx}{dy} + xy =$	$= e^{y^2/2}$, then the value
	a) -1	b) 1	c) ½	d) $-\frac{1}{2}$
7)	If the differential equat	tion $(av^2v + 2v^2 - 7)$	7	- 0 is exact then the

7)	If the differential equation $(ax^2y + 2y^2 - 7)dx + (x^3 + bxy - 8)dy = 0$ is exact, then the			
	value of a and b are	h) - 0 h 1	a) a 4 b 0	م (ا
	a) $a = 3, b = 4$	b) $a = 3, b = 1$	c) $a = 4, b = 3$	d) $a = 1, b = 3$

- 8) The length of subnormal to the curve $y^2 = 4ax$ is
- d) 4a a) a b) 2a c) 3a 9) The orthogonal trajectories of family of curve xy = a is
- a) $x^2 + y^2 = c$ b) $y^2 = 4ax$ d) $v^2 - x^2 = c$ c) $x = c \cdot y$
- 10) Which of the following method is not a step by step method?
 - b) Runge Kutta method of fourth order a) Euler's method c) Taylor's series method d) Euler's modified method
- 11) If $\frac{dy}{dx} = x + y$ with y(0) = 1 and h = 0.2, then by Euler's method the approximate value of
 - y(0.2) is equals to c) 1.4 d) -1.2a) 1 b) 1.2
- 12) To find the value of the derivatives numerically at the beginning or near to the beginning
 - value of argument x, we use a) Newton's forward difference formula b) Newton's backward difference formula
 - c) Central difference formula d) Divided difference formula
- 13) The curve $x^2 y^2 = a^2$ is symmetrical
 - a) about both axes b) about only one axis
 - c) in opposite quadrants d) none of these
- 14) The length of the arc of the curve x = f(t), $y = \phi(t)$ is

a)
$$\int_{t_{1}}^{t_{2}} \sqrt{\left(\frac{dx}{dt}\right)^{2} + \left(\frac{dy}{dt}\right)^{2}} dt$$
b)
$$\int_{t_{1}}^{t_{2}} \sqrt{\frac{dx}{dt} + \frac{dy}{dt}} dt$$
c)
$$\int_{t_{1}}^{t_{2}} \left(\frac{dx}{dt} + \frac{dy}{dt}\right) dt$$
d)
$$\int_{t_{1}}^{t_{2}} \left[\left(\frac{dx}{dt}\right)^{2} + \left(\frac{dy}{dt}\right)^{2}\right] dt$$



Seat	
No.	

F.E. (Part – II) (New CGPA) Examination, 2016 ENGINEERING MATHEMATICS – II

Day and Date: Monday, 21-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Attempt any three questions from each Section.

- 2) Figures to the right indicate full marks.
- 3) Use of calculator is allowed.

SECTION - I

2. a) Solve:
$$(x + y)dx + (3x + 3y - 4) dy = 0$$
.

b) Solve
$$(y \cdot \sec^2 x + \sec x \cdot \tan x) dx + (\tan x + 2y) dy = 0$$
.

c) Solve:
$$\frac{dy}{dx} + y \cdot \tan x = x^2 \cos^2(x).$$

OR

c) Solve:
$$x \cos y \frac{dy}{dx} + \sin y = x \sin^2 y$$
.

3. Attempt the following:

- a) Find the orthogonal trajectories of the curve $y = x + ae^x$ where 'a' is a parameter.
- b) Find the equation of the curve through the point (1, 0) such that the length of the subnormal at any point is directly proportional to $\frac{1}{x^3}$.
- c) The charge 'q' on the plate of a condenser of capacity C, charged through a resistance R by a steady voltage V satisfies the differential equation $R\frac{dq}{dt} + \frac{q}{c} = V$ if q = 0 when t = 0,

then show that charge 'q' is given by
$$q = cv \left(1 - e^{-\frac{t}{RC}}\right)$$
.

4. Attempt the following:

a) Using Picard's method, find the solution of $\frac{dy}{dx} = 1 + xy$ when y(0) = 1 upto third approximation.

Set S

3

3

3



3

3

- b) Using Runge Kutta method of fourth order to find y at x = 1.1 in one step, if $\frac{dy}{dx} = x^2 + y^2$ with initial condition y(1) = 1.5.
- c) Using Euler's method, find the approximate value of y at x = 0.8, where $\frac{dy}{dx} = 1 2xy$ with y(0) = 0, taking h = 0.2.
- 5. a) Find $\frac{dy}{dx}$, $\frac{d^2y}{dx^2}$ at x = 2 and at x = 2.7 from the following data.
 - **x** : 2 2.2 2.4 2.6 2.8
 - y : 2 5.576 9.968 15.272 21.584
 - b) Using divided difference formula, find the value of $\frac{dy}{dx}$ at x = 9 from the following data.
 - **x** : 5 7 11 13 17
 - y: 150 392 1452 2366 5202

SECTION - II

- 6. a) Evaluate $\int_0^1 \sqrt{x \log\left(\frac{1}{x}\right)} dx$.
 - b) Evaluate $\int_{0}^{1} \sqrt{x} (1-x^2)^{\frac{1}{3}} dx$.
 - c) Prove that $\int_0^\alpha \frac{\tan^{-1}ax \tan^{-1}bx}{x} \, dx = \frac{\pi}{2} \log \left(\frac{a}{b}\right) \text{ where a is parameter.}$
- 7. a) Trace the curve $y^2(2a x) = x^3$.
 - b) Trace the curve $r = 3 \sin 2\theta$.
 - c) Show that the length of the parabola $y^2 = 4ax$ from the vertex to the end of the latus rectum

is a $\left[\sqrt{2} + \log (1 + \sqrt{2}) \right]$.



8. a) Evaluate $\int_{0.0}^{1} e^{x+y} dy dx$.

b) Evaluate
$$\int_{0}^{a} \int_{0}^{x} \int_{0}^{\sqrt{x+y}} z \, dx \, dy \, dz$$
.

c) Change the order of integration and evaluate $\int_{1}^{2} \int_{1}^{x^2} \left(\frac{x^2}{y} \right) dx dy$.

OR

- c) Evaluate $\int \int (x^2 + y^2) x \, dx \, dy$ over the positive quadrant of the circle $x^2 + y^2 = a^2$.
- 9. a) Find the area common to the parabolas $y^2 = 4ax$ and $x^2 = 4ay$ by double integration.
 - b) The density of a uniform circular lamina of radius 'a' varies as the square of its density from a fixed point on the circumference of the circle r = 2a cos θ. Find the mass of Lamina.
 3
 - c) Calculate by double integration the volume generated by the revolution of the cardioid $r = a(1 \cos \theta)$ about its axis of symmetry.

Seat No.	Set	Р
		_

F.E. (Part – II) (New CGPA Pattern) Examination, 2016 BASIC CIVIL ENGINEERING

Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
 - 3) Q. No. 2 is compulsory in Section I. Solve any two questions from Q. No. 3 to Q. No. 5.
 - 4) Q. No. 6 is compulsory in Section II. Solve any two questions from Q. No. 7 to Q. No. 9.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

Choose the correct alternatives :

- 14
- 1) A civil engineer is said to play a role as structural designer if he is involved in
 - a) Preparation of contour map
 - b) Preparation of estimate
 - c) Preparation of valuation report
 - d) Preparation of stability report
- 2) In Geodetic surveying
 - a) Principles of plane trigonometry are used
 - b) Principles of spherical trigonometry are used
 - c) Ordinary instruments are used
 - d) Line joining two points is a straight line
- 3) The smallest division on a 30 m metallic tape is
 - a) 1 mm

b) 1 cm

c) 20 cm

- d) 30 cm
- 4) If fore bearing of a line PQ is S80°E and back bearing of line SP is S20°W, then included angle at station P is
 - a) 300°

b) 100°

c) 260°

d) None of these



a) Active b) Passive c) Neutral d) All or 7) As per roominess principle of building planning, a desirable ratio of breadth of a room is a) 1.2 to 1.5 b) 1.6 to 3.0 c) 3.1 to 4.5 d) 4.6 to 3.0 ln a gravity dam the water load is stabilised due to a) Arch action b) R.C.C. design c) Weight of dam d) None of the above 99 Rain water harvesting can be used for rain water flowing from a) Building terrace only b) Road side gutters only c) Water from courtyard only d) All the above 100 The lowermost layer of road is called a) Subbase b) Subgrade c) Crown d) Base 111 In a single lane road the width is a) 3.75 m b) 6 m c) 9 m d) 12 m d) 12 m lighway b) Railway c) Waterway d) Airw 120 The most suitable transportation for door to door service is a) Highway b) Railway c) Waterway d) Airw 131 For better strength and workability, the water cement ratio should exceed a) 0.40 to 0.55 b) 0.55 to 0.70 c) 0.70 to 0.85 d) 0.85 to 1.0 ln The M7.5 grade concrete is suitable for a) Plane Cement Concrete b) Foundation c) Column d) Ream	5)	Reduced level of a on the station 'P' is 'Q' is 3.000 m, the a) 490.000 m	s 4.000 m (staff inv n reduced level of	erted).	If the staff r 'Q' will be	rea	•
breadth of a room is a) 1.2 to 1.5 b) 1.6 to 3.0 c) 3.1 to 4.5 d) 4.6 to 8) In a gravity dam the water load is stabilised due to a) Arch action b) R.C.C. design c) Weight of dam d) None of the above 9) Rain water harvesting can be used for rain water flowing from a) Building terrace only b) Road side gutters only c) Water from courtyard only d) All the above 10) The lowermost layer of road is called a) Subbase b) Subgrade c) Crown d) Base 11) In a single lane road the width is a) 3.75 m b) 6 m c) 9 m d) 12 m 12) The most suitable transportation for door to door service is a) Highway b) Railway c) Waterway d) Airw 13) For better strength and workability, the water cement ratio shoule exceed a) 0.40 to 0.55 b) 0.55 to 0.70 c) 0.70 to 0.85 d) 0.85 to 1.0 14) The M7.5 grade concrete is suitable for a) Plane Cement Concrete b) Foundation c) Column	6)	Sun is source of _ a) Active	Remote S b) Passive	ensing (c) Neu	System. tral	d)	All of these
a) Arch action c) Weight of dam d) None of the above 9) Rain water harvesting can be used for rain water flowing from a) Building terrace only b) Road side gutters only c) Water from courtyard only d) All the above 10) The lowermost layer of road is called a) Subbase b) Subgrade c) Crown d) Base 11) In a single lane road the width is a) 3.75 m b) 6 m c) 9 m d) 12 m 12) The most suitable transportation for door to door service is a) Highway b) Railway c) Waterway d) Airw 13) For better strength and workability, the water cement ratio shoule exceed a) 0.40 to 0.55 c) 0.70 to 0.85 d) 0.55 to 0.70 c) 0.70 to 0.85 for lane Cement Concrete b) Foundation c) Column	7)	breadth of a room	is				_
a) Building terrace only b) Road side gutters only c) Water from courtyard only d) All the above 10) The lowermost layer of road is called a) Subbase b) Subgrade c) Crown d) Base 11) In a single lane road the width is a) 3.75 m b) 6 m c) 9 m d) 12 m 12) The most suitable transportation for door to door service is a) Highway b) Railway c) Waterway d) Airw 13) For better strength and workability, the water cement ratio shoule exceed a) 0.40 to 0.55 b) 0.55 to 0.70 c) 0.70 to 0.85 d) 0.85 to 1.0 14) The M7.5 grade concrete is suitable for a) Plane Cement Concrete b) Foundation c) Column	8)	a) Arch action	ne water load is sta	b) R.C	.C. design	ove)
a) Subbase b) Subgrade c) Crown d) Base 11) In a single lane road the width is a) 3.75 m b) 6 m c) 9 m d) 12 m l2) The most suitable transportation for door to door service is a) Highway b) Railway c) Waterway d) Airw l3) For better strength and workability, the water cement ratio shoul exceed a) 0.40 to 0.55 b) 0.55 to 0.70 c) 0.70 to 0.85 d) 0.85 to 1.0 l4) The M7.5 grade concrete is suitable for a) Plane Cement Concrete b) Foundation c) Column	9)	a) Building terraceb) Road side guttec) Water from cou	e only ers only	or rain w	vater flowin	g fr	om
a) 3.75 m b) 6 m c) 9 m d) 12 m 12) The most suitable transportation for door to door service is a) Highway b) Railway c) Waterway d) Airw 13) For better strength and workability, the water cement ratio should exceed a) 0.40 to 0.55 b) 0.55 to 0.70 c) 0.70 to 0.85 d) 0.85 to 1.0 14) The M7.5 grade concrete is suitable for a) Plane Cement Concrete b) Foundation c) Column	10)	-			wn	d)	Base
 a) Highway b) Railway c) Waterway d) Airway d) Airway exceed a) 0.40 to 0.55 b) 0.55 to 0.70 c) 0.70 to 0.85 d) 0.85 to 1.0 Hane Cement Concrete b) Foundation c) Column 	l1)	-		c) 9 m		d)	12 m
exceed a) 0.40 to 0.55 b) 0.55 to 0.70 c) 0.70 to 0.85 d) 0.85 to 1.0 14) The M7.5 grade concrete is suitable for a) Plane Cement Concrete b) Foundation c) Column	12)						
a) Plane Cement Concreteb) Foundationc) Column	13)	exceed a) 0.40 to 0.55	n and workability, tl	b) 0.55	to 0.70	itio	should not
<u></u>	14)	a) Plane Cementb) Foundation		for			



Seat	
No.	

F.E. (Part – II) (New CGPA Pattern) Examination, 2016 BASIC CIVIL ENGINEERING

Day and Date: Tuesday, 22-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Q. No. 2 is compulsory in Section – I. Solve any two questions from Q. No. 3 to Q. No. 5.

2) Q. No. 6 is compulsory in Section – II. Solve any two questions from Q. No. 7 to Q. No. 9.

SECTION - I

2. a) Discuss the role of civil engineer.

3

b) Write a note on errors in chaining.

3

4

- c) A chain was tested before starting of survey field and was found to be exactly 30 m. At the end of survey when it was tested again it was found to be .16 m too long. The area of plan drawn to a scale of 1 cm = 60 m was 92.50 cm². Find true area on the field.
- 3. a) State about reduced bearings.
 - b) The following bearings were observed while running a traverse ABCDA.
 - 1) Calculate included angle.
 - 2) At what station you suspect local attraction and by how much amount?
 - 3) Findout corrected bearings.

	/

Line	FB	ВВ
AB	44° 30′	226°30′
ВС	124°30′	303°30′
CD	181°	1°
DA	289°30′	108° 45′

b)	Write down importance of water management. Prove that local attraction does not affect included angle. Enlist different types of Bench Marks and write their suitability.	3
,	Write down any two characteristics of contour maps. The following consecutive readings were taken on a levelling staff with dumpy level. 3.865, 3.345, 2.930, 1.955, 0.865, 3.795, 2.635, 1.540, 1.925, 0.865 and 0.660. The instrument was shifted after taking fifth and eighth reading. The first reading was taken on BM of RL 150.25 m. Calculate reduced levels of all points using Rise and Fall method.	7
	SECTION - II	
•	Differentiate between load bearing structure and framed structure. A residential plot is of 25 m \times 25 m. A three storey building consisting of G.F. + 2 floors is proposed. How much area you can construct on each floor with FSI 1.6 ? Front and rear margins 3m and side margin 2.5 m.	6
ŕ	Explain building byelaws in accordance with building line and space requirement. Enlist principles of planning. Discuss any two principles with sketch.	4
,	Write down different types of concrete with their suitability. With neat sketch explain any two types of shallow foundation.	5
,	Write a note on "Rain Water Harvesting". Discuss the concept of "Green House Building".	5

c) 0.70 to 0.85

SLR-EP - 11

P.T.O.

Seat No.			Set	ဂြ	1
	F.E. (I	─ Part – II) (New CGPA Pattern) Examination, 2016			J

BASIC CIVIL ENGINEERING

Day and Date: Tuesday, 22-11-2016 Max. Marks: 70 Time: 10.00 a.m. to 1.00 p.m. Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of
- 3) Q. No. 2 is compulsory in Section I. Solve any two questions from Q. No. 3 to Q. No. 5.
 4) Q. No. 6 is compulsory in Section II. Solve any two

d) 0.85 to 1.0

Marks : 14
14
om
Base
12 m
Airway
should not

7)	The M7.5 grade co a) Plane Cement (b) Foundation c) Column d) Beam		for		
8)	A civil engineer is s a) Preparation of c b) Preparation of c c) Preparation of c d) Preparation of s	contour map estimate valuation report	s structural designe	er if I	he is involved in
9)	In Geodetic survey a) Principles of pla b) Principles of spl c) Ordinary instrur d) Line joining two	ne trigonometry a herical trigonomet nents are used	ry are used		
10)	The smallest division a) 1 mm c) 20 cm	on on a 30 m meta	allic tape is b) 1 cm d) 30 cm		
11)	If fore bearing of a then included angle a) 300° c) 260°		and back bearing o b) 100° d) None of these	f lin	e SP is S20°W,
12)	Reduced level of a on the station 'P' is 'Q' is 3.000 m, then a) 490.000 m	4.000 m (staff involved level of	verted). If the staff	read	ding on station
13)	Sun is source of _ a) Active		ensing System. c) Neutral	d)	All of these
14)	As per roominess p breadth of a room i a) 1.2 to 1.5	S	planning, a desiral c) 3.1 to 4.5		-



Seat	
No.	

F.E. (Part – II) (New CGPA Pattern) Examination, 2016 BASIC CIVIL ENGINEERING

Day and Date: Tuesday, 22-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Q. No. 2 is compulsory in Section – I. Solve any two questions from Q. No. 3 to Q. No. 5.

2) Q. No. 6 is compulsory in Section – II. Solve any two questions from Q. No. 7 to Q. No. 9.

SECTION - I

2. a) Discuss the role of civil engineer.

3

b) Write a note on errors in chaining.

- 3
- c) A chain was tested before starting of survey field and was found to be exactly 30 m. At the end of survey when it was tested again it was found to be .16 m too long. The area of plan drawn to a scale of 1 cm = 60 m was 92.50 cm². Find true area on the field.

4

3. a) State about reduced bearings.

- 2
- b) The following bearings were observed while running a traverse ABCDA.
 - 1) Calculate included angle.
 - 2) At what station you suspect local attraction and by how much amount?
 - 3) Findout corrected bearings.

Line	FB	ВВ
AB	44° 30′	226°30′
ВС	124° 30′	303°30′
CD	181°	1°
DA	289° 30′	108° 45′

4.	b)	Write down importance of water management. Prove that local attraction does not affect included angle. Enlist different types of Bench Marks and write their suitability.	3 3 3
5.	,	Write down any two characteristics of contour maps. The following consecutive readings were taken on a levelling staff with dumpy level. 3.865, 3.345, 2.930, 1.955, 0.865, 3.795, 2.635, 1.540, 1.925, 0.865 and 0.660. The instrument was shifted after taking fifth and eighth reading. The first reading was taken on BM of RL 150.25 m. Calculate reduced levels of all points using Rise and Fall method.	7
		SECTION - II	
6.	•	Differentiate between load bearing structure and framed structure. A residential plot is of 25 m \times 25 m. A three storey building consisting of G.F. + 2 floors is proposed. How much area you can construct on each floor with FSI 1.6 ? Front and rear margins 3m and side margin 2.5 m.	4
7.	,	Explain building byelaws in accordance with building line and space requirement. Enlist principles of planning. Discuss any two principles with sketch.	4 5
8.	•	Write down different types of concrete with their suitability. With neat sketch explain any two types of shallow foundation.	4 5
9.	,	Write a note on "Rain Water Harvesting". Discuss the concept of "Green House Building".	4 5

Seat No.	Set	R
	-	1

F.E. (Part – II) (New CGPA Pattern) Examination, 2016 BASIC CIVIL ENGINEERING

Day and Date : Tuesday, 22-11-2016	Max. Marks: 70
------------------------------------	----------------

Time: 10.00 a.m. to 1.00 p.m.

b) Road side gutters onlyc) Water from courtyard only

d) All the above

- Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
 - 3) Q. No. 2 is compulsory in Section I. Solve any two questions from Q. No. 3 to Q. No. 5.
 - 4) Q. No. 6 is compulsory in Section II. Solve any two questions from Q. No. 7 to Q. No. 9.

	MCQ/Objective Type Questions								
Dura	atio	n : 30 Minutes		•	•			Marks:	14
1.	Ch	oose the correct alt	ern	atives :					14
	1)	Reduced level of a on the station 'P' is 'Q' is 3.000 m, the a) 490.000 m	4.0 n re	000 m (staff inveduced level of	ert sta	ed). If the staff i tion 'Q' will be	ea	ding on station	
	2)	Sun is source of _ a) Active				• •	d)	All of these	
	3)	As per roominess p breadth of a room a) 1.2 to 1.5	is		•	•		· ·	
	4)	In a gravity dam th a) Arch action c) Weight of dam	e w	rater load is sta	b)	sed due to R.C.C. design None of the ab	ove)	
	5)	Rain water harvest a) Building terrace	_		or r	ain water flowin	g fr	rom	

SLR-E	P – 11	-2-				
6)	The lowermost layer a) Subbase	er of road is called b) Subgrade		Crown	d)	Base
7)	In a single lane roa a) 3.75 m	nd the width is b) 6 m	c)	9 m	d)	12 m
8)	The most suitable ta) Highway	transportation for (b) Railway		or to door service Waterway		Airway
9)	For better strength exceed a) 0.40 to 0.55 c) 0.70 to 0.85	and workability, tl	b)	water cement ra 0.55 to 0.70 0.85 to 1.0	tio	should not
10)	The M7.5 grade co a) Plane Cement (b) Foundation c) Column d) Beam		for			
11)	A civil engineer is so a) Preparation of c b) Preparation of c c) Preparation of so d) Preparation of so	contour map estimate valuation report	s st	ructural designe	r if l	ne is involved in
12)	In Geodetic survey a) Principles of pla b) Principles of spl c) Ordinary instrur d) Line joining two	ne trigonometry a herical trigonomet nents are used	ry a	are used		
13)	The smallest division a) 1 mm	on on a 30 m met		tape is 1 cm		

d) 30 cm

b) 100°

d) None of these

14) If fore bearing of a line PQ is S80°E and back bearing of line SP is S20°W,

c) 20 cm

a) 300°

c) 260°

then included angle at station P is



Seat	
No.	
110.	

F.E. (Part – II) (New CGPA Pattern) Examination, 2016 BASIC CIVIL ENGINEERING

Day and Date: Tuesday, 22-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Q. No. 2 is compulsory in Section – I. Solve any two questions from Q. No. 3 to Q. No. 5.

2) Q. No. 6 is compulsory in Section – II. Solve any two questions from Q. No. 7 to Q. No. 9.

SECTION - I

2. a) Discuss the role of civil engineer.

3

b) Write a note on errors in chaining.

3

4

c) A chain was tested before starting of survey field and was found to be exactly 30 m. At the end of survey when it was tested again it was found to be .16 m too long. The area of plan drawn to a scale of 1 cm = 60 m was 92.50 cm². Find true area on the field.

3. a) State about reduced bearings.

- b) The following bearings were observed while running a traverse ABCDA.
 - 1) Calculate included angle.
 - 2) At what station you suspect local attraction and by how much amount?
 - 3) Findout corrected bearings.

7

Line	FB	BB
AB	44° 30′	226°30′
ВС	124° 30′	303°30′
CD	181°	1°
DA	289° 30′	108° 45′

4.	b)	Write down importance of water management. Prove that local attraction does not affect included angle. Enlist different types of Bench Marks and write their suitability.	3
5.	,	Write down any two characteristics of contour maps. The following consecutive readings were taken on a levelling staff with dumpy level. 3.865, 3.345, 2.930, 1.955, 0.865, 3.795, 2.635, 1.540, 1.925, 0.865 and 0.660. The instrument was shifted after taking fifth and eighth reading. The first reading was taken on BM of RL 150.25 m. Calculate reduced levels of all points using Rise and Fall method.	7
		SECTION - II	
6.	•	Differentiate between load bearing structure and framed structure. A residential plot is of 25 m \times 25 m. A three storey building consisting of G.F. + 2 floors is proposed. How much area you can construct on each floor with FSI 1.6 ? Front and rear margins 3m and side margin 2.5 m.	6
7.	Í	Explain building byelaws in accordance with building line and space requirement. Enlist principles of planning. Discuss any two principles with sketch.	4
8.		Write down different types of concrete with their suitability. With neat sketch explain any two types of shallow foundation.	4
9.	•	Write a note on "Rain Water Harvesting". Discuss the concept of "Green House Building".	4

Seat No.	Set	S

	r.E. (Part –	BASIC CIVIL E		,	lion,	2010
-	d Date : Tuesday, 2 10.00 a.m. to 1.00					Max. Marks : 70
•	2) A 2) A D P 3) G q 4) G	D. No. 1 is come of minutes in An arries one mark. Inswer MCQ/Objorn't forget to repair of the competitions from Q. Do. 6 is compuestions from Q. Duestions	swer E ective mentio oulsory No. 3 oulsory	Book Page No type question on, Q.P. Set (y in Section – to Q. No. 5. y in Section –	. 3. E s on I P/Q/I - 1. S	Each question Page No. 3 only. R/S) on Top of Polve any two
Duratio	on : 30 Minutes	MCQ/Objective	Туре	Questions		Marks : 14
					14	
1)	The lowermost lay a) Subbase			Crown	d) E	Base
2)	In a single lane roaa) 3.75 m	ad the width is b) 6 m	c) 9) m	d) 1	2 m
3)	The most suitable a) Highway	transportation fo b) Railway		to door servic Vaterway		Airway
4)	For better strength exceed a) 0.40 to 0.55 c) 0.70 to 0.85	and workability,	b) C	ater cement ra 0.55 to 0.70 0.85 to 1.0	atio sl	hould not
5)	The M7.5 grade co a) Plane Cement c) Column		b) F	oundation Beam		
6)	A civil engineer is s a) Preparation of b) Preparation of c) Preparation of	contour map estimate	as stru	ıctural designe	er if he	e is involved in

d) Preparation of stability report

-2-



7)	In Geodetic surveying a) Principles of plane trigonometry are used b) Principles of spherical trigonometry are used c) Ordinary instruments are used d) Line joining two points is a straight line							
8)	The smallest division a) 1 mm c) 20 cm	on on a 30 m meta	allic tape is b) 1 cm d) 30 cm					
9)	If fore bearing of a then included angle a) 300° c) 260°		and back bearing o b) 100° d) None of these	f line SP is S20°W,				
10)	Reduced level of a on the station 'P' is 'Q' is 3.000 m, then a) 490.000 m	s 4.000 m (staff inv n reduced level of	verted). If the staff station 'Q' will be	reading on station				
11)	Sun is source of _ a) Active	Remote S b) Passive	ensing System. c) Neutral	d) All of these				
12)	As per roominess p breadth of a room i a) 1.2 to 1.5	is		•				
13)	In a gravity dam th a) Arch action c) Weight of dam	e water load is sta	abilised due to b) R.C.C. design d) None of the ab	ove				
14)	Rain water harvest a) Building terrace b) Road side gutte c) Water from cou d) All the above	only ers only	or rain water flowin	g from				



Seat	
No.	

F.E. (Part – II) (New CGPA Pattern) Examination, 2016 BASIC CIVIL ENGINEERING

Day and Date: Tuesday, 22-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Q. No. 2 is compulsory in Section – I. Solve any two questions from Q. No. 3 to Q. No. 5.

2) Q. No. 6 is compulsory in Section – II. Solve any two questions from Q. No. 7 to Q. No. 9.

SECTION - I

2. a) Discuss the role of civil engineer.

3

b) Write a note on errors in chaining.

3

4

- c) A chain was tested before starting of survey field and was found to be exactly 30 m. At the end of survey when it was tested again it was found to be .16 m too long. The area of plan drawn to a scale of 1 cm = 60 m was 92.50 cm². Find true area on the field.
- 3. a) State about reduced bearings.
 - b) The following bearings were observed while running a traverse ABCDA.
 - 1) Calculate included angle.
 - 2) At what station you suspect local attraction and by how much amount?
 - 3) Findout corrected bearings.

Line	FB	ВВ
AB	44° 30′	226°30′
ВС	124°30′	303°30′
CD	181°	1°
DA	289° 30′	108° 45′

4.	b)	Write down importance of water management. Prove that local attraction does not affect included angle. Enlist different types of Bench Marks and write their suitability.	3 3 3
5.	,	Write down any two characteristics of contour maps. The following consecutive readings were taken on a levelling staff with dumpy level. 3.865, 3.345, 2.930, 1.955, 0.865, 3.795, 2.635, 1.540, 1.925, 0.865 and 0.660. The instrument was shifted after taking fifth and eighth reading. The first reading was taken on BM of RL 150.25 m. Calculate reduced levels of all points using Rise and Fall method.	7
		SECTION - II	
6.	•	Differentiate between load bearing structure and framed structure. A residential plot is of 25 m \times 25 m. A three storey building consisting of G.F. + 2 floors is proposed. How much area you can construct on each floor with FSI 1.6 ? Front and rear margins 3m and side margin 2.5 m.	4 6
7.		Explain building byelaws in accordance with building line and space requirement. Enlist principles of planning. Discuss any two principles with sketch.	4 5
8.	,	Write down different types of concrete with their suitability. With neat sketch explain any two types of shallow foundation.	4 5
9.	,	Write a note on "Rain Water Harvesting". Discuss the concept of "Green House Building".	4 5

Seat	
No.	

Set P

F.E. (Part – II) (New) (CGPA) Examination, 2016 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Wednesday, 23-11-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

- **N.B.:** 1) Q. No. **1** is **compulsory**. It should be solved in first **30 minutes** in Answer Book Page No. **3**. **Each** question carries **one** mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
 - 3) Figures to right indicate full marks.
 - 4) Assume data if needed.
 - 5) All questions are compulsory.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

SECTION - I

(Basic Electronics)

1.	Choose the correct answer :			7
	1) LVDT has	primary winding and	secondary winding.	
	a) one, two	b) two, one	c) one, one d) two, two	
	2) The terminal taken out fro	m p-type of layer in p-n ju	nction diode is called	
	a) cathode	b) anode	c) emitter d) base	
	3) Colour bands on resistor	are brown, black black, go	ld its value is	
	a) 10 Ω \pm 5%	b) 10 Ω \pm 10%	c) $100\Omega\pm5\%$ d) $100\Omega\pm10\%$	
	4) Solar cell is a	transducer.		
	a) active	b) passive	c) resistive d) inductive	
	5) 1's compliment of 0101 is			
	a) 1010	b) 1011	c) 1111 d) 0000	
	Example of electro-mecha	anical switch is		
	a) toggle switch		b) band switch	
	c) push button switch		d) relay	
	7) Zener diode can be used	as		
	a) regulator		c) amplifier d) oscillator	

7



SECTION - II

(Computer Programming)

8)	Whi	ich of the following is the	e valid C variable name ?				
	a)	for	b) 1 st	c)	var name	d)	Num 1
9)	Find	d out the invalid mathem	atical statement in C.				
	a)	area = 1/2*base*height	t;	b)	area = 3.14*r*r;		
	c)	slope = $(y2-y1) \div (x2-y1)$	x1);	d)	si = p*r*n/100;		
10)	Wh	at is the difference between	een the 4's in the followin	ıg tv	vo expressions ?		
	int r	num [4] ;					
	nun	n [4] = 20 ;					
	a)	First is particular eleme	ent, second is type				
	b)	First is array size, seco	nd is particular element				
		First is particular eleme					
	d)	First is array size, seco	nd is invalid statement				
11)	Wh	at is the output of the fol	lowing statement ?				
	prin	tf (" \"Hello\" Good/'morr	ning\' ") ;				
	a)	\"Hello\" Good\'morning	g\'	b)	\Hello\Good 'morning'		
	c)	"Hello" Good 'morning'		d)	Error in the statement		
12)	Uni	on stud					
	{						
	C	char name [10] ;					
	i	nt rno ;					
	f	loat percent ;					
	} s1	;					
	Hov	w many memory bytes a	re allocated for the variab	le s	1 ?		
	a)	2	b) 4	c)	10	d)	16
13)		symbol is us	sed to represent the flow	of p	rogram in flow chart.		
	a)	Square	b) Rectangle	c)	Rhombus	d)	Arrow
14)	The	output of the following i	s:				
		char x = 'a'					
		printf ("%d", x);					
	a)	ʻa'	b) 97	c)	Α	d)	Error



Seat	
No.	

F.E. (Part – II) (New) (CGPA) Examination, 2016 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Wednesday, 23-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Figures to right indicate full marks.

- 2) Assume data if needed.
- 3) All questions are compulsory.

SECTION - I

(Basic Electronics)

2. Solve any four: (4×4=16)

- a) Draw and explain transistor as an amplifier.
 - b) Explain photo-electric pickup in detail.
 - c) Explain relay (electromechanical switch).
 - d) Draw and explain construction of aluminium electrolytic capacitor.
 - e) Draw and explain half wave rectifier with suitable waveforms.

3. Solve any two: (2×6=12)

- a) State and proof Demorgaon's theorem and write the Boolean equation for NAND, NOR, EX-OR and EX-NOR gate.
- b) Explain thermo couple and how temp. is measured using thermo couple and explain its types.
- c) Draw experimental setup for V-I characteristics of common emitter configuration and explain input output characteristics.

SECTION - II

(Computer Programming)

4. Attempt any four: (4×4=16)

- a) What are the logical operators used in C? Explain their use with example.
- b) Find out the errors in the following program and rewrite the corrected program code again.

```
\label{eq:continuous_print} \begin{array}{l} \mbox{void main ()} \\ \{ & \mbox{int } x = 30, \, y = 40 \; ; \\ & \mbox{if } (x = y) \\ & \mbox{print (" x is equal to y\n") ;} \\ & \mbox{elseif } (x > y) \\ & \mbox{printf (" x is greater than y\n") ;} \\ & \mbox{elseif } (x < y) \\ & \mbox{printf (" x is smaller than y\n") ;} \\ \} \end{array}
```

c) Explain structure and union with similarity and differences.



d) Write the output of the following program and explain.

e) Write the output of the following program with the reason for the output.

```
#include<stdio.h> void fun (int*, int*); void main ()  \{ \\ & \text{int } i = 5, j = 2 ; \\ & \text{printf ("%d %d\n", i, j) ;} \\ & \text{fun (\&i, &j) ;} \\ & \text{printf ("%d %d\n", i, j) ;} \\ \} \\ & \text{void fun (int * i, int * j)} \\ \{ \\ & *j = *i * *i ; \\ & *j = *j * *j ; \\ \}
```

5. Attempt any two: (2×6=12)

- a) What is do-while loop? Elaborate with its syntax, use and example program code part.
- b) Write a program to read three subjects marks and display the result as Distinction/ First class/ Second class/ Pass class/Fail according to the calculated percentage.
- c) Write a program to display a factorial of a given number.

```
(e.g. Factorial of 4 = 4! = 1 \times 2 \times 3 \times 4 = 24).
```

	5

F.E. (Part – II) (New) (CGPA) Examination, 2016 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date : Wednesday, 23-11-2016 Time : 10.00 a.m. to 1.00 p.m.	Max. Marks : 70
N.B.: 1) Q. No. 1 is compulsory. It should be a Page No. 3. Each question carries one	
2) Answer MCQ/Objective type question mention, Q.P. Set (P/Q/R/S) on Top of	ons on Page No. 3 only. Don't forget to

- 3) Figures to **right** indicate **full** marks.
- 4) Assume data if needed.
- 5) All questions are compulsory.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

			SECTION	1 – I				
			(Basic Elect	ron	ics)			
1.	Choose the correct answer :							7
	1) Colour bands on resistor a	are b	rown, black black, gol	d its	value is			
	a) 10 Ω \pm 5%	b)	10 Ω \pm 10%	c)	100 Ω \pm 5%	d)	100 Ω \pm 10%	
	2) Solar cell is a		transducer.					
	a) active	b)	passive	c)	resistive	d)	inductive	
	3) 1's compliment of 0101 is							
	a) 1010	b)	1011	c)	1111	d)	0000	
	4) Example of electro-mecha	anica	I switch is					
	a) toggle switch			b)	band switch			
	c) push button switch			d)	relay			
	5) Zener diode can be used	as						
	a) regulator	b)	filter	c)	amplifier	d)	oscillator	
	6) LVDT has	prir	nary winding and		secondary win	ding	J.	
	a) one, two	b)	two, one	c)	one, one	d)	two, two	
	7) The terminal taken out fro	m p-	type of layer in p-n jun	ctio	n diode is called			
	a) cathode	b)	anode	c)	emitter	d)	base	

7



SECTION - II

(Computer Programming)

8)	What is the difference betw	een the 4's in the followin	g tv	vo expressions ?			
	int num [4];						
	num [4] = 20 ;						
	a) First is particular element, second is type						
	b) First is array size, second is particular element						
	c) First is particular element, second is array size						
٥)	d) First is array size, second is invalid statement						
9)	What is the output of the fol	_					
	printf (" \"Hello\" Good\'morr			\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\			
	a) \"Hello\" Good\'morningc) "Hello" Good 'morning'			\Hello\Good 'morning' Error in the statement			
10)	Union stud		u,	Life in the statement			
10)							
	{						
	char name [10];						
	int rno ;						
	float percent;						
	}s1;						
	How many memory bytes are allocated for the variable s1 ?						
	a) 2	b) 4	c)	10	d)	16	
11)	symbol is us	sed to represent the flow	of p	rogram in flow chart.			
	a) Square	b) Rectangle	c)	Rhombus	d)	Arrow	
12)	The output of the following i	s:					
	char x = 'a'						
	printf ("%d", x);						
	a) 'a'	b) 97	c)	Α	d)	Error	
13)	Which of the following is the	e valid C variable name ?					
	a) for	b) 1 st	c)	var name	d)	Num 1	
14)							
	a) area = $1/2*base*height$			area = $3.14*r*r$; si = $p*r*n/100$;			
	c) slope = $(y2-y1) \div (x2-y1)$	X I I.	a١	c: - p:r:p/1/1/1			



Seat	
No.	

F.E. (Part – II) (New) (CGPA) Examination, 2016 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Wednesday, 23-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Figures to right indicate full marks.

- 2) Assume data if needed.
- 3) All questions are compulsory.

SECTION - I

(Basic Electronics)

2. Solve any four: (4×4=16)

- a) Draw and explain transistor as an amplifier.
 - b) Explain photo-electric pickup in detail.
 - c) Explain relay (electromechanical switch).
 - d) Draw and explain construction of aluminium electrolytic capacitor.
 - e) Draw and explain half wave rectifier with suitable waveforms.

3. Solve any two: (2×6=12)

- a) State and proof Demorgaon's theorem and write the Boolean equation for NAND, NOR, EX-OR and EX-NOR gate.
- b) Explain thermo couple and how temp. is measured using thermo couple and explain its types.
- c) Draw experimental setup for V-I characteristics of common emitter configuration and explain input output characteristics.

SECTION - II

(Computer Programming)

4. Attempt any four: (4×4=16)

- a) What are the logical operators used in C ? Explain their use with example.
- b) Find out the errors in the following program and rewrite the corrected program code again.

```
\label{eq:continuous_print} \begin{array}{l} \mbox{void main ()} \\ \{ & \mbox{int } x = 30, \, y = 40 \; ; \\ & \mbox{if } (x = y) \\ & \mbox{print (" x is equal to y\n") ;} \\ & \mbox{elseif } (x > y) \\ & \mbox{printf (" x is greater than y\n") ;} \\ & \mbox{elseif } (x < y) \\ & \mbox{printf (" x is smaller than y\n") ;} \\ \} \end{array}
```

c) Explain structure and union with similarity and differences.



d) Write the output of the following program and explain.

e) Write the output of the following program with the reason for the output.

```
#include<stdio.h> void fun (int*, int*); void main ()  \{ \\ & \text{int } i = 5, j = 2 ; \\ & \text{printf ("%d %d\n", i, j) ;} \\ & \text{fun (\&i, &j) ;} \\ & \text{printf ("%d %d\n", i, j) ;} \\ \} \\ & \text{void fun (int * i, int * j)} \\ \{ \\ & *j = *i * *i ; \\ & *j = *j * *j ; \\ \}
```

5. Attempt any two: (2×6=12)

- a) What is do-while loop? Elaborate with its syntax, use and example program code part.
- b) Write a program to read three subjects marks and display the result as Distinction/ First class/ Second class/ Pass class/Fail according to the calculated percentage.
- c) Write a program to display a factorial of a given number.

```
(e.g. Factorial of 4 = 4! = 1 \times 2 \times 3 \times 4 = 24).
```

Seat	
No.	

a) active

b) passive

c) resistive

Set R

No.					
		F.E. (Part – II) (New) (C BASIC ELECTRONICS AND	GPA) Examination, 2016 COMPUTER PROGRAMI		
	d Date: Wednesday, 10.00 a.m. to 1.00 p.m			Max. Mark	s:70
	N.B.	 Q. No. 1 is compulsory. Page No. 3. Each question Answer MCQ/Objective mention, Q.P. Set (P/Q/R) Figures to right indicate for the Assume data if needed. All questions are compulsory. 	on carries one mark. type questions on Page (S) on Top of Page. ull marks.	et 30 minutes in Answer Book	
		MCQ/Objective	Type Questions		
Duratio	on : 30 Minutes			Mark	s: 14
		SECT	ION – I		
		(Basic El	ectronics)		
1. C	Choose the correct ans	wer:			7
	1) 1's compliment of	0101 is			
	a) 1010	b) 1011	c) 1111	d) 0000	
	2) Example of electron	o-mechanical switch is			
	a) toggle switch		b) band switch		
	c) push button s	witch	d) relay		
	3) Zener diode can b	e used as			
	a) regulator	b) filter	c) amplifier	d) oscillator	
	4) LVDT has	primary winding and _	secondary	winding.	
	a) one, two	b) two, one	c) one, one	d) two, two	
	5) The terminal taken	out from p-type of layer in p-n	junction diode is called		
	a) cathode	b) anode	c) emitter	d) base	
	6) Colour bands on re	esistor are brown, black black,	gold its value is		
	a) 10 Ω \pm 5%	b) 10 Ω \pm 10%	c) 100 Ω \pm 5%	d) 100 Ω \pm 10%	
	7) Solar cell is a	transducer.			

d) inductive

7



SECTION - II

(Computer Programming)

8)	Uni	on stud							
	{								
	char name [10];								
	int rno ;								
	f	loat percent ;							
	} s1	;							
	Hov	v many memory bytes a	re allocated for the variab	le s	1 ?				
	a)	2	b) 4	c)	10	d)	16		
9)		symbol is us	sed to represent the flow	of p	rogram in flow chart.				
	a)	Square	b) Rectangle	c)	Rhombus	d)	Arrow		
10)	The	output of the following i	s:						
		char x = 'a'							
		printf ("%d", x);							
	a)	ʻa'	b) 97	c)	Α	d)	Error		
11)	Whi	ich of the following is the	e valid C variable name ?						
	a)	for	b) 1 st	c)	var name	d)	Num 1		
12)	Find	d out the invalid mathem	atical statement in C.						
	a)	area = 1/2*base*height	;	b)	area = $3.14*r*r$;				
	c)	slope = $(y2-y1) \div (x2-y1)$	x1);	d)	si = p*r*n/100;				
13)	Wh	at is the difference between	een the 4's in the following	g tv	vo expressions ?				
	int r	num [4] ;							
	nun	n [4] = 20 ;							
	a)	First is particular eleme	nt, second is type						
	b)	First is array size, seco	nd is particular element						
	c) First is particular element, second is array size								
	d)	First is array size, seco	nd is invalid statement						
14)	Wh	at is the output of the fol	lowing statement ?						
	prin	tf (" \"Hello\" Good\'morr	ning\' ") ;						
	-	\"Hello\" Good\'morning	y\'	b)	\Hello\Good 'morning'				
	c)	"Hello" Good 'morning'		d)	Error in the statement				



Seat	
No.	

F.E. (Part – II) (New) (CGPA) Examination, 2016 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Wednesday, 23-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Figures to right indicate full marks.

- 2) Assume data if needed.
- 3) All questions are compulsory.

SECTION - I

(Basic Electronics)

2. Solve any four: (4×4=16)

- a) Draw and explain transistor as an amplifier.
 - b) Explain photo-electric pickup in detail.
 - c) Explain relay (electromechanical switch).
 - d) Draw and explain construction of aluminium electrolytic capacitor.
 - e) Draw and explain half wave rectifier with suitable waveforms.

3. Solve any two: (2×6=12)

- a) State and proof Demorgaon's theorem and write the Boolean equation for NAND, NOR, EX-OR and EX-NOR gate.
- b) Explain thermo couple and how temp. is measured using thermo couple and explain its types.
- c) Draw experimental setup for V-I characteristics of common emitter configuration and explain input output characteristics.

SECTION - II

(Computer Programming)

4. Attempt any four: (4×4=16)

- a) What are the logical operators used in C? Explain their use with example.
- b) Find out the errors in the following program and rewrite the corrected program code again.

```
\label{eq:continuous_print} \begin{array}{l} \mbox{void main ()} \\ \{ & \mbox{int } x = 30, \, y = 40 \; ; \\ & \mbox{if } (x = y) \\ & \mbox{print (" x is equal to y\n");} \\ & \mbox{elseif } (x > y) \\ & \mbox{printf (" x is greater than y\n");} \\ & \mbox{elseif } (x < y) \\ & \mbox{printf (" x is smaller than y\n");} \\ \} \end{array}
```

c) Explain structure and union with similarity and differences.

Set R



d) Write the output of the following program and explain.

e) Write the output of the following program with the reason for the output.

```
#include<stdio.h> void fun (int*, int*); void main ()  \{ \\ & \text{int } i = 5, j = 2 ; \\ & \text{printf ("%d %d\n", i, j) ;} \\ & \text{fun (\&i, &j) ;} \\ & \text{printf ("%d %d\n", i, j) ;} \\ \} \\ & \text{void fun (int * i, int * j)} \\ \{ \\ & *j = *i * *i ; \\ & *j = *j * *j ; \\ \}
```

5. Attempt any two: (2×6=12)

- a) What is do-while loop? Elaborate with its syntax, use and example program code part.
- b) Write a program to read three subjects marks and display the result as Distinction/ First class/ Second class/ Pass class/Fail according to the calculated percentage.
- c) Write a program to display a factorial of a given number.

```
(e.g. Factorial of 4 = 4! = 1 \times 2 \times 3 \times 4 = 24).
```

Seat	
No.	

F.E. (Part - II) (New) (CGPA) Examination, 2016 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Wednesday, 23-11-2016	Max. Marks: 70
Time: 10.00 a.m. to 1.00 a.m.	

Time: 10.00 a.m. to 1.00 p.m.

1.

- N.B.: 1) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
 - 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
 - 3) Figures to **right** indicate **full** marks.
 - 4) Assume data if needed.
 - 5) All questions are compulsory.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

SECTION - I

(Basic Electronics)

Cho	ose the correct answer :				7
1)	Zener diode can be used	as			
	a) regulator	b) filter	c) amplifier	d) oscillator	
2)	LVDT has	primary winding and	secondary win	ding.	
	a) one, two	b) two, one	c) one, one	d) two, two	
3)	The terminal taken out fro	m p-type of layer in p-n ju	nction diode is called		
	a) cathode	b) anode	c) emitter	d) base	
4)	Colour bands on resistor	are brown, black black, go	ld its value is		
	a) 10 Ω \pm 5%	b) 10 Ω \pm 10%	c) 100 Ω \pm 5%	d) 100 Ω \pm 10%	
5)	Solar cell is a	transducer.			
	a) active	b) passive	c) resistive	d) inductive	
6)	1's compliment of 0101 is				
	a) 1010	b) 1011	c) 1111	d) 0000	
7)	Example of electro-mecha	anical switch is			
	a) toggle switch		b) band switch		
	c) push button switch		d) relay		

7



SECTION - II

(Computer Programming)

10)	a) find	h of the following is the	b) 97 valid C variable name ?	c)	A	q)	
10)	Whice a) find a) a	a' h of the following is the or	•	c)	A	۹)	
10)	Whice a) find a) a	h of the following is the	•	c)	Α	۹)	
10)	a) find	or	valid C variable name ?			u)	Error
ŕ	Find a)						
ŕ	a) i		b) 1 st	c)	var name	d)	Num 1
11)	-	out the invalid mathem	atical statement in C.				
11)	() (area = 1/2*base*height		-	area = 3.14*r*r;		
11)		slope = $(y2-y1) \div (x2-x)$		-	si = p*r*n/100;		
	Wha	is the difference betwe	een the 4's in the followin	g tv	o expressions?		
	int nu	ım [4] ;					
	num	[4] = 20 ;					
	•	First is particular eleme					
	-	-	nd is particular element nt, second is array size				
		First is array size, seco					
12)	•	is the output of the following					
,		(" \"Hello\" Good\'morn	_				
		"Hello\" Good\'morning		b)	\Hello\Good 'morning'		
	c) '	'Hello" Good 'morning'		d)	Error in the statement		
13)	Unio	n stud					
	{						
	cł	ar name [10] ;					
	in	rno ;					
	flo	eat percent;					
	} s1 ;						
	How	many memory bytes a	e allocated for the variab	le s	1 ?		
	a) :	2	b) 4	c)	10	d)	16
14)		symbol is us	ed to represent the flow	of p	rogram in flow chart.		
	a) :	Square	b) Rectangle	c)	Rhombus	d)	Arrow
14)		symbol is us	ed to represent the flow	of p	rogram in flow chart.		



Seat	
No.	

F.E. (Part – II) (New) (CGPA) Examination, 2016 BASIC ELECTRONICS AND COMPUTER PROGRAMMING

Day and Date: Wednesday, 23-11-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: 1) Figures to right indicate full marks.

- 2) Assume data if needed.
- 3) All questions are compulsory.

SECTION - I

(Basic Electronics)

2. Solve any four: (4×4=16)

- a) Draw and explain transistor as an amplifier.
 - b) Explain photo-electric pickup in detail.
 - c) Explain relay (electromechanical switch).
 - d) Draw and explain construction of aluminium electrolytic capacitor.
 - e) Draw and explain half wave rectifier with suitable waveforms.

3. Solve any two: (2×6=12)

- a) State and proof Demorgaon's theorem and write the Boolean equation for NAND, NOR, EX-OR and EX-NOR gate.
- b) Explain thermo couple and how temp. is measured using thermo couple and explain its types.
- c) Draw experimental setup for V-I characteristics of common emitter configuration and explain input output characteristics.

SECTION - II

(Computer Programming)

4. Attempt any four: (4×4=16)

a) What are the logical operators used in C? Explain their use with example.

b) Find out the errors in the following program and rewrite the corrected program code again.

```
\label{eq:continuous_print} \begin{array}{l} \mbox{void main ()} \\ \{ & \mbox{int } x = 30, \, y = 40 \; ; \\ & \mbox{if } (x = y) \\ & \mbox{print (" x is equal to y\n");} \\ & \mbox{elseif } (x > y) \\ & \mbox{printf (" x is greater than y\n");} \\ & \mbox{elseif } (x < y) \\ & \mbox{printf (" x is smaller than y\n");} \\ \} \end{array}
```

c) Explain structure and union with similarity and differences.



d) Write the output of the following program and explain.

e) Write the output of the following program with the reason for the output.

5. Attempt any two: (2×6=12)

- a) What is do-while loop? Elaborate with its syntax, use and example program code part.
- b) Write a program to read three subjects marks and display the result as Distinction/ First class/ Second class/ Pass class/Fail according to the calculated percentage.
- c) Write a program to display a factorial of a given number.

```
(e.g. Factorial of 4 = 4! = 1 \times 2 \times 3 \times 4 = 24).
```

SLR-EP - 14

Seat No.		Р	1
----------	--	---	---

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

Constants: 1) Avogadro's no., $N = 6.02 \times 10^{26}$ /k.mol.

- 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
- 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

1. Choose the correct answers : 14

- 1) The waves used in Sonography are
 - a) Microwaves
- b) Infrared waves
- c) Ultraviolet waves
 d) Ultrasonic 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) $V \ge C$
- 3) An p-type semiconductor is
 - a) Positively charged
- b) Negatively chargedd) None of the above
- c) Electrically neutrald) None of the about4) Classify the following unit cell into proper crystal system
- a = 1.08 nm, b = 0.947 nm, c = 0.52 nm with α = 41°, β = 82° and γ = 95°.
 - a) Triclinic b) Orthorhombic
 - c) Monoclinic d) Hexagonal
- 5) The ultrasonic waves exhibit
 - a) Large diffraction effect b) Negligible diffraction effect
 - c) Very long wavelength d) Faster speed than light waves

SLR-EP - 14



- 6) The conductivity of a material is
 - a) $\sigma = p.e.\mu$

b) $\mu.\sigma = p.e$

c) $\sigma = p.e/\rho.\mu$

- d) $\sigma = R_{H.u}$
- 7) Choose the incorrect statement concerning the theory of relativity
 - a) Velocity of light is independent of motion
 - b) It proves the existence of the ether of the observer
 - c) Time is relative
 - d) There is variation of mass with velocity
- 8) To find prominent diffraction, the size of the diffraction objects should be
 - a) greater than the wavelength of light used
 - b) of the order of wavelength of light
 - c) less than the wavelength of light
 - d) none of these
- 9) A calcite crystal is a
 - a) Uniaxial crystal
 - c) Positive crystal

- b) Biaxial crystal
- d) Opaque crystal

- 10) Holography means
 - a) To get 2D image of 3D object
- b) To get zero dimension image
- c) To get 3D image of 3D object
- d) To get 3D image of 2D object
- 11) If d is the core diameter of the fiber, then V-number is given by

a)
$$V = \frac{\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

b)
$$V = \frac{\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

c)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

d)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

- 12) The optical fiber has $n_1 = 1.45$ and $n_2 = 1.40$. The critical angle of the fiber is
 - a) 73°45'

b) 75°45'

c) 72°54'

- d) 74°54'
- 13) Nuclear Fission reaction is
 - a) Combination of two light nuclei, to form heavy and stable nucleus
 - b) Division of heavy nucleus into approximately two equal parts
 - c) Disintegration of nuclei into unstable nucleus
 - d) Thermonuclear reaction
- 14) Multi Wall Carbon Nanotubes (MWCNT) have diameters ranging from
 - a) 2 to 25 nm

b) 5 to 25 nm

c) 2 to 50 nm

d) 20 to 25 nm

-3-

Seat No.

F.E. (Part – I) (CBCS) Examination, 2016 **ENGINEERING PHYSICS**

Marks: 56 Day and Date: Wednesday, 21-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

2) Figures to the **right** indicate **full** marks.

1) Avogadro's no., $N = 6.02 \times 10^{26} / k.mol$. Constants:

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

2. Attempt any five of the following:

15

- a) Explain Bragg's law.
- b) Explain the principle of:
 - i) Magnetostriction method

ii) Piezo electric method.

- c) Explain Time dilation.
- d) The lattice constant for BCC iron at 20°C is 2.85 A.U. The density of an iron is 7870 kg/m³. Calculate its atomic mass.
- e) Classify the solids into insulator, semiconductor and conductor on the basis of band theory of solids.
- f) A specimen of aluminum has 6×10⁻⁵ m thickness. A current of 10 A flows through it and a magnetic field of induction 1.45 T is applied perpendicular to the current direction. Determine the concentration of charge carrier in the material when developed Hall voltage is 10 μ V.
- g) Write properties of ultrasonic waves.
- 3. Show that in cubic crystal the spacing between consecutive parallel planes of Miller indices (h k l) is given by:

$$d_{hk_l} = \frac{a}{\sqrt{h^2 + k^2 + l^2}} \cdot$$

Derive the formula, m = $\frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$ for the variation of mass with velocity according

to the special theory of relativity.



4. Attempt any two of the following:

8

- a) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define atomic radius. Find the relation between lattice constant and atomic radius for BCC and FCC.
- c) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- d) Deduce Einstein's expression for mass-energy equivalence.

SECTION - II

5. Attempt any five of the following:

15

- a) Distinguish between Fresnel diffraction and Fraunhofer diffraction.
- b) Calculate the specific rotation if the plane of polarization is turned through 26°15′ travelling 20 cm length of 20% sugar solution.
- c) Define:
 - 1) Stimulated emission
- 2) Spontaneous emission.
- d) Explain types of carbon nanotubes depending on chirality.
- e) Give applications of LASER in different fields.
- f) The numerical aperture of fiber is 0.25 and relative refractive index is 0.02. Determine the refractive indices of the core and cladding of a fibre.
- g) Write the advantages of optical fiber over conducting wire.
- 6. With neat energy transition diagram, explain He-Ne gas laser.

5

OR

Explain the design, working and function of each part of the nuclear fission reactors.

7. Attempt any two of the following:

8

- a) With theory, explain plane diffraction grating.
- b) Describe Laurent's half shade polarimeter for the determination of specific rotation of the substance.
- c) Explain:

i) P-P cycle

ii) C-N cycle.

d) Deduce the expression for acceptance angle of optical fiber and explain how it can be calculated with the help of fractional refractive index change.



SLR-EP – 14

Seat	
No.	

F.E. (Part – I) (CBCS) Examination, 2016 **ENGINEERING PHYSICS**

Day and Date: Wednesday, 21-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each guestion carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

1) Avogadro's no., $N = 6.02 \times 10^{26} / k.mol$. **Constants:**

- 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
- 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14 14

- 1. Choose the correct answers:
 - 1) To find prominent diffraction, the size of the diffraction objects should be
 - a) greater than the wavelength of light used
 - b) of the order of wavelength of light
 - c) less than the wavelength of light
 - d) none of these
 - 2) A calcite crystal is a
 - a) Uniaxial crystal
 - c) Positive crystal
 - 3) Holography means
 - a) To get 2D image of 3D object

 - c) To get 3D image of 3D object
- b) To get zero dimension image
- d) To get 3D image of 2D object
- 4) If d is the core diameter of the fiber, then V-number is given by

a)
$$V = \frac{\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

b)
$$V = \frac{\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

b) Biaxial crystal

d) Opaque crystal

c)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

d)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

5)	The optical fiber has n	$_1$ = 1.45 and n_2 = 1.40. The critical angle of the fiber is
	a) 73°45'	b) 75°45'
	c) 72°54'	d) 74°54'

- 6) Nuclear Fission reaction is
 - a) Combination of two light nuclei, to form heavy and stable nucleus
 - b) Division of heavy nucleus into approximately two equal parts
 - c) Disintegration of nuclei into unstable nucleus
 - d) Thermonuclear reaction
- 7) Multi Wall Carbon Nanotubes (MWCNT) have diameters ranging from
 - a) 2 to 25 nm

b) 5 to 25 nm

c) 2 to 50 nm

- d) 20 to 25 nm
- 8) The waves used in Sonography are
 - a) Microwaves

b) Infrared waves

c) Ultraviolet waves

- d) Ultrasonic waves
- 9) 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 > C

- d) $v \ll c$
- 10) An p-type semiconductor is
 - a) Positively charged

b) Negatively charged

c) Electrically neutral

- d) None of the above
- 11) Classify the following unit cell into proper crystal system
 - a = 1.08 nm, b = 0.947 nm, c = 0.52 nm with α = 41°, β = 82° and γ = 95°.
 - a) Triclinic

b) Orthorhombic

c) Monoclinic

- d) Hexagonal
- 12) The ultrasonic waves exhibit
 - a) Large diffraction effect

 - c) Very long wavelength
- b) Negligible diffraction effect
- d) Faster speed than light waves
- 13) The conductivity of a material is
 - a) $\sigma = p.e.\mu$

b) $\mu . \sigma = p.e$

c) $\sigma = p.e/\rho.\mu$

- d) $\sigma = R_{H,u}$
- 14) Choose the incorrect statement concerning the theory of relativity
 - a) Velocity of light is independent of motion
 - b) It proves the existence of the ether of the observer
 - c) Time is relative
 - d) There is variation of mass with velocity

-3-

Seat No.

F.E. (Part – I) (CBCS) Examination, 2016 **ENGINEERING PHYSICS**

Marks: 56 Day and Date: Wednesday, 21-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

2) Figures to the **right** indicate **full** marks.

1) Avogadro's no., $N = 6.02 \times 10^{26} / k.mol$. Constants:

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

2. Attempt any five of the following:

15

- a) Explain Bragg's law.
- b) Explain the principle of:
 - i) Magnetostriction method

ii) Piezo electric method.

- c) Explain Time dilation.
- d) The lattice constant for BCC iron at 20°C is 2.85 A.U. The density of an iron is 7870 kg/m³. Calculate its atomic mass.
- e) Classify the solids into insulator, semiconductor and conductor on the basis of band theory of solids.
- f) A specimen of aluminum has 6×10⁻⁵ m thickness. A current of 10 A flows through it and a magnetic field of induction 1.45 T is applied perpendicular to the current direction. Determine the concentration of charge carrier in the material when developed Hall voltage is 10 μ V.
- g) Write properties of ultrasonic waves.
- 3. Show that in cubic crystal the spacing between consecutive parallel planes of Miller indices (h k l) is given by:

$$d_{hk_l} = \frac{a}{\sqrt{h^2 + k^2 + l^2}} \cdot$$

Derive the formula, m = $\frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$ for the variation of mass with velocity according

to the special theory of relativity.



4. Attempt any two of the following:

8

- a) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define atomic radius. Find the relation between lattice constant and atomic radius for BCC and FCC.
- c) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- d) Deduce Einstein's expression for mass-energy equivalence.

SECTION - II

5. Attempt any five of the following:

15

- a) Distinguish between Fresnel diffraction and Fraunhofer diffraction.
- b) Calculate the specific rotation if the plane of polarization is turned through 26°15′ travelling 20 cm length of 20% sugar solution.
- c) Define:
 - 1) Stimulated emission
- 2) Spontaneous emission.
- d) Explain types of carbon nanotubes depending on chirality.
- e) Give applications of LASER in different fields.
- f) The numerical aperture of fiber is 0.25 and relative refractive index is 0.02. Determine the refractive indices of the core and cladding of a fibre.
- g) Write the advantages of optical fiber over conducting wire.
- 6. With neat energy transition diagram, explain He-Ne gas laser.

5

OR

Explain the design, working and function of each part of the nuclear fission reactors.

7. Attempt any two of the following:

8

- a) With theory, explain plane diffraction grating.
- b) Describe Laurent's half shade polarimeter for the determination of specific rotation of the substance.
- c) Explain:

i) P-P cycle

ii) C-N cycle.

d) Deduce the expression for acceptance angle of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

SLR-EP - 14

Set R

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

Constants:

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

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

- 1. Choose the correct answers:
 - 1) The ultrasonic waves exhibit
 - a) Large diffraction effect
 - c) Very long wavelength
 - 2) The conductivity of a material is

a)
$$\sigma = p.e.\mu$$

c)
$$\sigma = p.e/\rho.\mu$$

- b) Negligible diffraction effect
- d) Faster speed than light waves
- b) $\mu.\sigma = p.e$
- d) $\sigma = R_{HII}$
- 3) Choose the incorrect statement concerning the theory of relativity
 - a) Velocity of light is independent of motion
 - b) It proves the existence of the ether of the observer
 - c) Time is relative
 - d) There is variation of mass with velocity
- 4) To find prominent diffraction, the size of the diffraction objects should be
 - a) greater than the wavelength of light used
 - b) of the order of wavelength of light
 - c) less than the wavelength of light
 - d) none of these



- 5) A calcite crystal is a
 - a) Uniaxial crystal
 - c) Positive crystal

- b) Biaxial crystal
- d) Opaque crystal

- 6) Holography means
 - a) To get 2D image of 3D object
- b) To get zero dimension image
- c) To get 3D image of 3D object
- d) To get 3D image of 2D object
- 7) If d is the core diameter of the fiber, then V-number is given by

a)
$$V = \frac{\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

b)
$$V = \frac{\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

c)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

d)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

- 8) The optical fiber has $n_1 = 1.45$ and $n_2 = 1.40$. The critical angle of the fiber is
 - a) 73°45'

b) 75°45'

c) 72°54'

- d) 74°54'
- 9) Nuclear Fission reaction is
 - a) Combination of two light nuclei, to form heavy and stable nucleus
 - b) Division of heavy nucleus into approximately two equal parts
 - c) Disintegration of nuclei into unstable nucleus
 - d) Thermonuclear reaction
- 10) Multi Wall Carbon Nanotubes (MWCNT) have diameters ranging from
 - a) 2 to 25 nm

b) 5 to 25 nm

c) 2 to 50 nm

- d) 20 to 25 nm
- 11) The waves used in Sonography are
 - a) Microwaves

b) Infrared waves

c) Ultraviolet waves

- d) Ultrasonic waves
- 12) 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 << c
- 13) An p-type semiconductor is
 - a) Positively charged

b) Negatively charged

c) Electrically neutral

- d) None of the above
- 14) Classify the following unit cell into proper crystal system
 - a = 1.08 nm, b = 0.947 nm, c = 0.52 nm with α = 41°, β = 82° and γ = 95°.
 - a) Triclinic

b) Orthorhombic

c) Monoclinic

d) Hexagonal



Seat No.

F.E. (Part – I) (CBCS) Examination, 2016 **ENGINEERING PHYSICS**

Marks: 56 Day and Date: Wednesday, 21-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

2) Figures to the **right** indicate **full** marks.

1) Avogadro's no., $N = 6.02 \times 10^{26} / k.mol$. Constants:

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

2. Attempt any five of the following:

15

- a) Explain Bragg's law.
- b) Explain the principle of:
 - i) Magnetostriction method

ii) Piezo electric method.

- c) Explain Time dilation.
- d) The lattice constant for BCC iron at 20°C is 2.85 A.U. The density of an iron is 7870 kg/m³. Calculate its atomic mass.
- e) Classify the solids into insulator, semiconductor and conductor on the basis of band theory of solids.
- f) A specimen of aluminum has 6×10⁻⁵ m thickness. A current of 10 A flows through it and a magnetic field of induction 1.45 T is applied perpendicular to the current direction. Determine the concentration of charge carrier in the material when developed Hall voltage is 10 μ V.
- g) Write properties of ultrasonic waves.
- 3. Show that in cubic crystal the spacing between consecutive parallel planes of Miller indices (h k l) is given by:

$$d_{hk_l} = \frac{a}{\sqrt{h^2 + k^2 + l^2}} \cdot$$

Derive the formula, m = $\frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$ for the variation of mass with velocity according

to the special theory of relativity.



4. Attempt any two of the following:

8

- a) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define atomic radius. Find the relation between lattice constant and atomic radius for BCC and FCC.
- c) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- d) Deduce Einstein's expression for mass-energy equivalence.

SECTION - II

5. Attempt any five of the following:

15

- a) Distinguish between Fresnel diffraction and Fraunhofer diffraction.
- b) Calculate the specific rotation if the plane of polarization is turned through 26°15′ travelling 20 cm length of 20% sugar solution.
- c) Define:
 - 1) Stimulated emission
- 2) Spontaneous emission.
- d) Explain types of carbon nanotubes depending on chirality.
- e) Give applications of LASER in different fields.
- f) The numerical aperture of fiber is 0.25 and relative refractive index is 0.02. Determine the refractive indices of the core and cladding of a fibre.
- g) Write the advantages of optical fiber over conducting wire.
- 6. With neat energy transition diagram, explain He-Ne gas laser.

5

OR

Explain the design, working and function of each part of the nuclear fission reactors.

7. Attempt any two of the following:

8

- a) With theory, explain plane diffraction grating.
- b) Describe Laurent's half shade polarimeter for the determination of specific rotation of the substance.
- c) Explain:

i) P-P cycle

ii) C-N cycle.

d) Deduce the expression for acceptance angle of optical fiber and explain how it can be calculated with the help of fractional refractive index change.



SLR-EP – 14

Seat No.

F.E. (Part – I) (CBCS) Examination, 2016 **ENGINEERING PHYSICS**

Day and Date: Wednesday, 21-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each guestion carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

1) Avogadro's no., $N = 6.02 \times 10^{26} / k.mol$. **Constants:**

- 2) Velocity of light, $c = 3 \times 10^8 \text{ m/sec.}$
- 3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14 14

- 1. Choose the correct answers:
 - 1) Holography means a) To get 2D image of 3D object b) To get zero dimension image
 - c) To get 3D image of 3D object d) To get 3D image of 2D object
 - 2) If d is the core diameter of the fiber, then V-number is given by

a)
$$V = \frac{\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

b)
$$V = \frac{\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

c)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_1^2 - n_2^2}$$

d)
$$V = \frac{2\pi d}{\lambda} \sqrt{n_2^2 - n_1^2}$$

- 3) The optical fiber has $n_1 = 1.45$ and $n_2 = 1.40$. The critical angle of the fiber is
 - a) 73°45'

b) 75°45'

c) 72°54'

- d) 74°54'
- 4) Nuclear Fission reaction is
 - a) Combination of two light nuclei, to form heavy and stable nucleus
 - b) Division of heavy nucleus into approximately two equal parts
 - c) Disintegration of nuclei into unstable nucleus
 - d) Thermonuclear reaction

	-2-		
5)	Multi Wall Carbon Nanotubes (MWCN	-	
	a) 2 to 25 nm	,	5 to 25 nm
٥)	c) 2 to 50 nm	u)	20 to 25 nm
6)	The waves used in Sonography are	L-\	Information
	a) Microwaves	,	Infrared waves
٦١	c) Ultraviolet waves	,	Ultrasonic waves
7)		•	v relative to the observer is same when
	a) $v = 0$,	v is comparable to c
٥)	C) $V \ge C$	u)	V << C
8)	An p-type semiconductor is	h۱	Negatively charged
	a) Positively chargedc) Electrically neutral		Negatively charged None of the above
0)	,	,	
9)	Classify the following unit cell into pro	-	
	a = 1.08 nm, b = 0.947 nm, c = 0.52 r		•
	a) Triclinic	,	Orthorhombic
>	c) Monoclinic	a)	Hexagonal
10)	The ultrasonic waves exhibit		N. 12 11 12 12 12 12 12 12 12 12 12 12 12
	a) Large diffraction effect	,	Negligible diffraction effect
4.4	c) Very long wavelength	a)	Faster speed than light waves
11)	The conductivity of a material is		
	a) $\sigma = p.e.\mu$,	μ . σ = p.e
	c) $\sigma = p.e / \rho.\mu$	d)	$\sigma = R_{H.\mu}$
12)	Choose the incorrect statement conce	ern	ing the theory of relativity
	a) Velocity of light is independent of r		
	b) It proves the existence of the ethe	r of	the observer
	c) Time is relative		
	d) There is variation of mass with vel		
13)	To find prominent diffraction, the size		
	a) greater than the wavelength of ligh	t us	sed
	b) of the order of wavelength of light		
	c) less than the wavelength of light		
4.4\	d) none of these		
14)	A calcite crystal is a	h١	Diavial arratal
	a) Uniaxial crystal	,	Biaxial crystal
	c) Positive crystal	u)	Opaque crystal

Set S

-3-

Seat No.

F.E. (Part – I) (CBCS) Examination, 2016 **ENGINEERING PHYSICS**

Marks: 56 Day and Date: Wednesday, 21-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, **if necessary**.

2) Figures to the **right** indicate **full** marks.

1) Avogadro's no., $N = 6.02 \times 10^{26} / k.mol$. Constants:

2) Velocity of light, $c = 3 \times 10^8$ m/sec.

3) Charge of electron, $e = 1.6 \times 10^{-19}$ C.

SECTION-I

2. Attempt any five of the following:

15

- a) Explain Bragg's law.
- b) Explain the principle of:
 - i) Magnetostriction method

ii) Piezo electric method.

- c) Explain Time dilation.
- d) The lattice constant for BCC iron at 20°C is 2.85 A.U. The density of an iron is 7870 kg/m³. Calculate its atomic mass.
- e) Classify the solids into insulator, semiconductor and conductor on the basis of band theory of solids.
- f) A specimen of aluminum has 6×10⁻⁵ m thickness. A current of 10 A flows through it and a magnetic field of induction 1.45 T is applied perpendicular to the current direction. Determine the concentration of charge carrier in the material when developed Hall voltage is 10 μ V.
- g) Write properties of ultrasonic waves.
- 3. Show that in cubic crystal the spacing between consecutive parallel planes of Miller indices (h k l) is given by:

$$d_{hk_l} = \frac{a}{\sqrt{h^2 + k^2 + l^2}} \cdot$$

Derive the formula, m = $\frac{m_0}{\sqrt{1-\frac{v^2}{c^2}}}$ for the variation of mass with velocity according

to the special theory of relativity.



4. Attempt any two of the following:

8

- a) Show that Fermi level (E_F) in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) Define atomic radius. Find the relation between lattice constant and atomic radius for BCC and FCC.
- c) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- d) Deduce Einstein's expression for mass-energy equivalence.

SECTION - II

5. Attempt any five of the following:

15

- a) Distinguish between Fresnel diffraction and Fraunhofer diffraction.
- b) Calculate the specific rotation if the plane of polarization is turned through 26°15′ travelling 20 cm length of 20% sugar solution.
- c) Define:
 - 1) Stimulated emission
- 2) Spontaneous emission.
- d) Explain types of carbon nanotubes depending on chirality.
- e) Give applications of LASER in different fields.
- f) The numerical aperture of fiber is 0.25 and relative refractive index is 0.02. Determine the refractive indices of the core and cladding of a fibre.
- g) Write the advantages of optical fiber over conducting wire.
- 6. With neat energy transition diagram, explain He-Ne gas laser.

5

OR

Explain the design, working and function of each part of the nuclear fission reactors.

7. Attempt any two of the following:

8

- a) With theory, explain plane diffraction grating.
- b) Describe Laurent's half shade polarimeter for the determination of specific rotation of the substance.
- c) Explain:

i) P-P cycle

ii) C-N cycle.

d) Deduce the expression for acceptance angle of optical fiber and explain how it can be calculated with the help of fractional refractive index change.

SLR-EP - 15

Seat No.				Set	Р
	-	- 	I) (0000) E a aliantina	204.0	

F.E. (Part – I) (CBCS) Examination, 2016 **ENGINEERING CHEMISTRY**

Max. Marks: 70 Day and Date: Friday, 23-12-2016

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each guestion carries one mark.
- 3) Figures to the **right** indicate **full** marks.
- 4) **Draw** neat and labelled diagram **wherever** necessary.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions **Duration: 30 Minutes** Marks: 14 1. Choose the correct answer: 1) Water containing magnesium bicarbonate and calcium chloride is a) Permanent hard only b) Temporary hard only c) Both temporary and permanent d) None of these 2) When graphite is dispersed in oil, it is called a) Grease b) Aquadag d) Blended oil c) Oil dag 3) During electrochemical corrosion in acidic environment. a) Oxygen absorption occurs b) Oxygen evolution occurs c) Hydrogen evolution occurs d) Hydrogen absorption occurs 4) A semipermiable membrane allows the flow of a) Solvent molecules b) Solute molecules c) Both a) and b) d) None of these

5) Oiliness is least in case of

a) Mineral oil

b) Animal oils

c) Greases

d) All of these

6)	Food stuff containers should not be		
	a) Galvanized	b)	Tinned
	c) Electroplated	d)	All of these
7)	Indigo is		
ŕ	a) Natural dye	b)	Artificial dye
	c) Corrosive chemical	d)	Lubricant
8)	The source of kerosene is		
	a) Crude petroleum	b)	Coal
	c) Wood	d)	None of these
9)	The melting point of wrought iron is		
	a) 1830°C	b)	1530°C
	c) 2000°C	d)	1330°C
10)	Phenol-Formaldehyde is an example of	of	
	a) Thermoplastic	b)	Thermo-elastic
	c) Thermosetting	d)	Thermite
11)	Annealing of glass is		
	a) Cooling glass articles rapidly		
	b) Passing molten glass between roll	ers	
	c) Allowing glass articles to cool grad	lua	lly
	d) Plunging glass articles suddenly in	ıto v	water
12)	Which of the following can not be use	d a	s carrier gas in GLC ?
	a) Nitrogen	b)	Argon
	c) Oxygen	d)	All of these
13)	A thermoplastics is formed by the phe	noı	menon of
	a) Chlorination	b)	Condensation polymerization
	c) Nitration	d)	Chain polymerization
14)	Boy's gas calorimeter is an apparatus	s us	sed to determine calorific value of
	a) Solid fuel		Non-volatile liquid fuel
	c) Volatile liquid fuel	d)	None of these



Seat	
No.	

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to the **right** indicate **full** marks.
- 3) **Draw** neat and labelled diagram **wherever** necessary.

SECTION - I

2. A) Solve any two:

8

- a) Define the terms:
 - i) Flash and fire point
 - ii) Viscosity index
 - iii) Cloud and pour point
 - iv) Aniline point.
- b) Explain the traditional and green pathway for synthesis of adipic acid.
- c) A sample of water on analysis was found to contain the following impurities in mg/L.

Impurities	Amount	Molecular Wt.
Ca(HCO ₃) ₂	12	162
$Mg (HCO_3)_2$	10	146
MgSO ₄	08	120
CaCl ₂	09	111

Calculate temporary, permanent and total hardness of water.

B) Solve any two:

- a) Explain 'semisolid lubricant'.
- b) Explain the mechanism of wet corrosion.
- c) Define aeration. Explain with suitable diagram the mechanism of gravity aerators.



8

- a) Explain ion exchange method for softening of hard water.
- b) How will you prevent the corrosion by proper designing and material selection?
- c) Explain: 1) Metal cladding 2) Potentiostat method for prevention of metal from corrosion.

B) Solve the following:

6

- a) Define 'Green Chemistry'. State any four principles of green chemistry.
- b) In an acid value determination experiment 8 gm of an oil sample required 2.9 ml of N/10 kOH solution for neutralization of phenolphthalein end point. Calculate the acid value of the oil sample.

SECTION - II

4. A) Solve any two:

8

- a) Explain the process of manufacturing of glass with suitable reactions.
- b) Explain construction and working of Boy's gas calorimeter.
- c) The bomb calorimeter recorded following observations:

Weight of coal burnt = 1.02 gm

Weight of water taken = 750 gm

Water equivalent of bomb and calorimeter = 2200 gm

Rise in temp. = 2.42°C

Cooling correction = 0.045°C

Fuse wire correction = 3 cal

Acid correction = 4.5 cal

Calculate the gross and net calorific value of fuel assuming the latent heat of condensation of steam as 540 cal/gm and H = 8%.

B) Solve any two:

- a) Explain applications of BUNA-S and thiokol rubber.
- b) Explain properties and applications of epoxy resin.
- c) Calculate molarity of a solution containing 20 gm of Na_2CO_3 in 2 lit and 10.5 gm of $CaCl_2$ in 1.5 lit. (mole wt. of $Na_2CO_3 = 106$, mole wt. of $CaCl_2 = 111$)



8

- a) Explain properties and applications of PVC and PET.
- b) Explain preparation of biodiesel with transesterification process. State its uses.
- c) Define alloy. Write the purposes of making alloys.

B) Solve the following:

6

- a) Explain process of vulcanization of natural rubber with suitable reactions.
- b) What are the number average and weight average molecular weight for a polymer having following composition.

100 molecules of molecular wt. 2×10^5 g/mole 300 molecules of molecular wt. 3×10^5 g/mole 400 molecules of molecular wt. 4×10^5 g/mole.

OR

- B) Solve the following:
 - a) Explain transfer moulding for plastic.
 - b) Degree of polymerization of polypropylene is 2×10^4 , calculate the mole wt. of polymer. (molecular wt. of propylene = 42 gm).

SLR-EP - 15

Seat	Set	C
No.	Jei J	<u>u</u>

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. No. 1 is **compulsory**. It should be solved in **first** 30 minutes in Answer Book Page No. 3. Each question carries **one** mark.
- 3) Figures to the right indicate full marks.
- 4) **Draw** neat and labelled diagram **wherever** necessary.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration: 30 Minutes Marks: 14

1. Choose the correct answer:

14

- 1) The source of kerosene is
 - a) Crude petroleum

b) Coal

c) Wood

- d) None of these
- 2) The melting point of wrought iron is
 - a) 1830°C

b) 1530°C

c) 2000°C

- d) 1330°C
- 3) Phenol-Formaldehyde is an example of
 - a) Thermoplastic

b) Thermo-elastic

c) Thermosetting

d) Thermite

- 4) 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

5)	Which of the following can not be use	d a	s carrier gas in GLC ?
	a) Nitrogen	b)	Argon
	c) Oxygen	d)	All of these
6)	A thermoplastics is formed by the phe	noı	menon of
	a) Chlorination	b)	Condensation polymerization
	c) Nitration	d)	Chain polymerization
7)	Boy's gas calorimeter is an apparatus	s us	ed to determine calorific value of
	a) Solid fuel	b)	Non-volatile liquid fuel
	c) Volatile liquid fuel	d)	None of these
8)	Water containing magnesium bicarbo	nat	e and calcium chloride is
	a) Permanent hard only	b)	Temporary hard only
	c) Both temporary and permanent	d)	None of these
9)	When graphite is dispersed in oil, it is	ca	lled
	a) Grease	b)	Aquadag
	c) Oil dag	d)	Blended oil
10)	During electrochemical corrosion in a	cidi	c environment.
	a) Oxygen absorption occurs	b)	Oxygen evolution occurs
	c) Hydrogen evolution occurs	d)	Hydrogen absorption occurs
11)	A semipermiable membrane allows th	e fl	ow of
	a) Solvent molecules	b)	Solute molecules
	c) Both a) and b)	d)	None of these
12)	Oiliness is least in case of		
	a) Mineral oil	b)	Animal oils
	c) Greases	d)	All of these
13)	Food stuff containers should not be		
	a) Galvanized	b)	Tinned
	c) Electroplated	d)	All of these
14)	Indigo is		
	a) Natural dye	b)	Artificial dye
	c) Corrosive chemical	d)	Lubricant



Seat	
No.	

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to the **right** indicate **full** marks.
- 3) **Draw** neat and labelled diagram **wherever** necessary.

SECTION - I

2. A) Solve any two:

8

- a) Define the terms:
 - i) Flash and fire point
 - ii) Viscosity index
 - iii) Cloud and pour point
 - iv) Aniline point.
- b) Explain the traditional and green pathway for synthesis of adipic acid.
- c) A sample of water on analysis was found to contain the following impurities in mg/L.

Impurities	Amount	Molecular Wt.
Ca(HCO ₃) ₂	12	162
$Mg(HCO_3)_2$	10	146
MgSO ₄	08	120
CaCl ₂	09	111

Calculate temporary, permanent and total hardness of water.

B) Solve any two:

- a) Explain 'semisolid lubricant'.
- b) Explain the mechanism of wet corrosion.
- c) Define aeration. Explain with suitable diagram the mechanism of gravity aerators.



8

- a) Explain ion exchange method for softening of hard water.
- b) How will you prevent the corrosion by proper designing and material selection?
- c) Explain: 1) Metal cladding 2) Potentiostat method for prevention of metal from corrosion.

B) Solve the following:

6

- a) Define 'Green Chemistry'. State any four principles of green chemistry.
- b) In an acid value determination experiment 8 gm of an oil sample required 2.9 ml of N/10 kOH solution for neutralization of phenolphthalein end point. Calculate the acid value of the oil sample.

SECTION - II

4. A) Solve any two:

8

- a) Explain the process of manufacturing of glass with suitable reactions.
- b) Explain construction and working of Boy's gas calorimeter.
- c) The bomb calorimeter recorded following observations:

Weight of coal burnt = 1.02 gm

Weight of water taken = 750 gm

Water equivalent of bomb and calorimeter = 2200 gm

Rise in temp. = 2.42°C

Cooling correction = 0.045°C

Fuse wire correction = 3 cal

Acid correction = 4.5 cal

Calculate the gross and net calorific value of fuel assuming the latent heat of condensation of steam as 540 cal/gm and H = 8%.

B) Solve any two:

- a) Explain applications of BUNA-S and thiokol rubber.
- b) Explain properties and applications of epoxy resin.
- c) Calculate molarity of a solution containing 20 gm of Na_2CO_3 in 2 lit and 10.5 gm of $CaCl_2$ in 1.5 lit. (mole wt. of Na_2CO_3 = 106, mole wt. of $CaCl_2$ = 111)



8

- a) Explain properties and applications of PVC and PET.
- b) Explain preparation of biodiesel with transesterification process. State its uses.
- c) Define alloy. Write the purposes of making alloys.

B) Solve the following:

6

- a) Explain process of vulcanization of natural rubber with suitable reactions.
- b) What are the number average and weight average molecular weight for a polymer having following composition.

100 molecules of molecular wt. 2×10^5 g/mole 300 molecules of molecular wt. 3×10^5 g/mole 400 molecules of molecular wt. 4×10^5 g/mole.

OR

- B) Solve the following:
 - a) Explain transfer moulding for plastic.
 - b) Degree of polymerization of polypropylene is 2×10^4 , calculate the mole wt. of polymer. (molecular wt. of propylene = 42 gm).

SLR-EP - 15

Seat No.	Set	R

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date : Friday, 23-12-2016 Max. Marks : 70 Time : 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 3) Figures to the right indicate full marks.
- 4) **Draw** neat and labelled diagram **wherever** necessary.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions **Duration: 30 Minutes** Marks: 14 1. Choose the correct answer: 14 1) Oiliness is least in case of a) Mineral oil b) Animal oils c) Greases d) All of these 2) Food stuff containers should not be a) Galvanized b) Tinned d) All of these c) Electroplated 3) Indigo is a) Natural dye b) Artificial dye c) Corrosive chemical d) Lubricant 4) The source of kerosene is a) Crude petroleum b) Coal d) None of these c) Wood 5) The melting point of wrought iron is a) 1830°C b) 1530°C c) 2000°C d) 1330°C



6)	Phenol-Formaldehyde is an example	of
	a) Thermoplastic	b) Thermo-elastic
	c) Thermosetting	d) Thermite
7)	Annealing of glass is	
	a) Cooling glass articles rapidly	
	b) Passing molten glass between roll	ers
	c) Allowing glass articles to cool grad	dually
	d) Plunging glass articles suddenly in	nto water
8)	Which of the following can not be use	d as carrier gas in GLC ?
	a) Nitrogen	b) Argon
	c) Oxygen	d) All of these
9)	A thermoplastics is formed by the phe	nomenon of
	a) Chlorination	b) Condensation polymerization
	c) Nitration	d) Chain polymerization
10)	Boy's gas calorimeter is an apparatus	s used to determine calorific value of
	a) Solid fuel	b) Non-volatile liquid fuel
	c) Volatile liquid fuel	d) None of these
11)	Water containing magnesium bicarbo	nate and calcium chloride is
	a) Permanent hard only	b) Temporary hard only
	c) Both temporary and permanent	d) None of these
12)	When graphite is dispersed in oil, it is	called
	a) Grease	b) Aquadag
	c) Oil dag	d) Blended oil
13)	During electrochemical corrosion in a	
	a) Oxygen absorption occurs	b) Oxygen evolution occurs
	c) Hydrogen evolution occurs	d) Hydrogen absorption occurs
14)	A semipermiable membrane allows th	
	a) Solvent molecules	b) Solute molecules
	c) Both a) and b)	d) None of these



Seat	
No.	

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to the **right** indicate **full** marks.
- 3) **Draw** neat and labelled diagram **wherever** necessary.

SECTION - I

2. A) Solve any two:

8

- a) Define the terms:
 - i) Flash and fire point
 - ii) Viscosity index
 - iii) Cloud and pour point
 - iv) Aniline point.
- b) Explain the traditional and green pathway for synthesis of adipic acid.
- c) A sample of water on analysis was found to contain the following impurities in mg/L.

Impurities	Amount	Molecular Wt.
Ca(HCO ₃) ₂	12	162
$Mg(HCO_3)_2$	10	146
MgSO ₄	08	120
CaCl ₂	09	111

Calculate temporary, permanent and total hardness of water.

B) Solve any two:

- a) Explain 'semisolid lubricant'.
- b) Explain the mechanism of wet corrosion.
- c) Define aeration. Explain with suitable diagram the mechanism of gravity aerators.



8

- a) Explain ion exchange method for softening of hard water.
- b) How will you prevent the corrosion by proper designing and material selection?
- c) Explain: 1) Metal cladding 2) Potentiostat method for prevention of metal from corrosion.

B) Solve the following:

6

- a) Define 'Green Chemistry'. State any four principles of green chemistry.
- b) In an acid value determination experiment 8 gm of an oil sample required 2.9 ml of N/10 kOH solution for neutralization of phenolphthalein end point. Calculate the acid value of the oil sample.

SECTION - II

4. A) Solve any two:

8

- a) Explain the process of manufacturing of glass with suitable reactions.
- b) Explain construction and working of Boy's gas calorimeter.
- c) The bomb calorimeter recorded following observations:

Weight of coal burnt = 1.02 gm

Weight of water taken = 750 gm

Water equivalent of bomb and calorimeter = 2200 gm

Rise in temp. = 2.42°C

Cooling correction = 0.045° C

Fuse wire correction = 3 cal

Acid correction = 4.5 cal

Calculate the gross and net calorific value of fuel assuming the latent heat of condensation of steam as 540 cal/gm and H = 8%.

B) Solve any two:

6

- a) Explain applications of BUNA-S and thiokol rubber.
- b) Explain properties and applications of epoxy resin.
- c) Calculate molarity of a solution containing 20 gm of Na_2CO_3 in 2 lit and 10.5 gm of $CaCl_2$ in 1.5 lit. (mole wt. of Na_2CO_3 = 106, mole wt. of $CaCl_2$ = 111)

Set R



8

- a) Explain properties and applications of PVC and PET.
- b) Explain preparation of biodiesel with transesterification process. State its uses.
- c) Define alloy. Write the purposes of making alloys.

B) Solve the following:

6

- a) Explain process of vulcanization of natural rubber with suitable reactions.
- b) What are the number average and weight average molecular weight for a polymer having following composition.

100 molecules of molecular wt. 2×10⁵ g/mole 300 molecules of molecular wt. 3×10⁵ g/mole

400 molecules of molecular wt. 4×10^5 g/mole.

OR

- B) Solve the following:
 - a) Explain transfer moulding for plastic.
 - b) Degree of polymerization of polypropylene is 2×10^4 , calculate the mole wt. of polymer. (molecular wt. of propylene = 42 gm).

SLR-EP - 15

Set	S
	Set

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Max. Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) **All** questions are **compulsory**.

- 2) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 3) Figures to the **right** indicate **full** marks.
- 4) **Draw** neat and labelled diagram **wherever** necessary.
- 5) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Duration : 30 Minutes Marks : 14

- 1) Phenol-Formaldehyde is an example of
 - a) Thermoplastic

b) Thermo-elastic

c) Thermosetting

1. Choose the correct answer:

d) Thermite

- 2) 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
- 3) Which of the following can not be used as carrier gas in GLC?

a) Nitrogen

b) Argon

c) Oxygen

- d) All of these
- 4) A thermoplastics is formed by the phenomenon of

a) Chlorination

b) Condensation polymerization

c) Nitration

d) Chain polymerization



5)	Boy's gas calorimeter is an apparatus	s us	sed to determine calorific value of	
	a) Solid fuel	b)	Non-volatile liquid fuel	
	c) Volatile liquid fuel	d)	None of these	
6)	Water containing magnesium bicarbo	nat	e and calcium chloride is	
	a) Permanent hard only	b)	Temporary hard only	
	c) Both temporary and permanent	d)	None of these	
7)	7) When graphite is dispersed in oil, it is called			
	a) Grease	b)	Aquadag	
	c) Oil dag	d)	Blended oil	
8)	During electrochemical corrosion in a	cid	ic environment.	
	a) Oxygen absorption occurs	b)	Oxygen evolution occurs	
	c) Hydrogen evolution occurs	d)	Hydrogen absorption occurs	
9)	A semipermiable membrane allows th	e fl	ow of	
	a) Solvent molecules	b)	Solute molecules	
	c) Both a) and b)	d)	None of these	
10)	Oiliness is least in case of			
	a) Mineral oil	b)	Animal oils	
	c) Greases	d)	All of these	
11)	Food stuff containers should not be			
	a) Galvanized	b)	Tinned	
	c) Electroplated	d)	All of these	
12)	Indigo is			
	a) Natural dye	b)	Artificial dye	
	c) Corrosive chemical	d)	Lubricant	
13)	The source of kerosene is			
,	a) Crude petroleum	b)	Coal	
	c) Wood	d)	None of these	
14)	The melting point of wrought iron is			
,	a) 1830°C	b)	1530°C	
	c) 2000°C	•	1330°C	
		•		

Set S



Seat	
No.	

F.E. (Part – I) (CBCS) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) All questions are compulsory.

- 2) Figures to the **right** indicate **full** marks.
- 3) **Draw** neat and labelled diagram **wherever** necessary.

SECTION - I

2. A) Solve any two:

8

- a) Define the terms:
 - i) Flash and fire point
 - ii) Viscosity index
 - iii) Cloud and pour point
 - iv) Aniline point.
- b) Explain the traditional and green pathway for synthesis of adipic acid.
- c) A sample of water on analysis was found to contain the following impurities in mg/L.

Impurities	Amount	Molecular Wt.
Ca(HCO ₃) ₂	12	162
$Mg(HCO_3)_2$	10	146
MgSO ₄	08	120
CaCl ₂	09	111

Calculate temporary, permanent and total hardness of water.

B) Solve any two:

- a) Explain 'semisolid lubricant'.
- b) Explain the mechanism of wet corrosion.
- c) Define aeration. Explain with suitable diagram the mechanism of gravity aerators.



3. A) Solve any two:

8

- a) Explain ion exchange method for softening of hard water.
- b) How will you prevent the corrosion by proper designing and material selection?
- c) Explain: 1) Metal cladding 2) Potentiostat method for prevention of metal from corrosion.

B) Solve the following:

6

- a) Define 'Green Chemistry'. State any four principles of green chemistry.
- b) In an acid value determination experiment 8 gm of an oil sample required 2.9 ml of N/10 kOH solution for neutralization of phenolphthalein end point. Calculate the acid value of the oil sample.

SECTION - II

4. A) Solve any two:

8

- a) Explain the process of manufacturing of glass with suitable reactions.
- b) Explain construction and working of Boy's gas calorimeter.
- c) The bomb calorimeter recorded following observations:

Weight of coal burnt = 1.02 gm

Weight of water taken = 750 gm

Water equivalent of bomb and calorimeter = 2200 gm

Rise in temp. = 2.42°C

Cooling correction = 0.045° C

Fuse wire correction = 3 cal

Acid correction = 4.5 cal

Calculate the gross and net calorific value of fuel assuming the latent heat of condensation of steam as 540 cal/gm and H = 8%.

B) Solve any two:

- a) Explain applications of BUNA-S and thiokol rubber.
- b) Explain properties and applications of epoxy resin.
- c) Calculate molarity of a solution containing 20 gm of Na_2CO_3 in 2 lit and 10.5 gm of $CaCl_2$ in 1.5 lit. (mole wt. of $Na_2CO_3 = 106$, mole wt. of $CaCl_2 = 111$)



5. A) Solve any two:

8

- a) Explain properties and applications of PVC and PET.
- b) Explain preparation of biodiesel with transesterification process. State its uses.
- c) Define alloy. Write the purposes of making alloys.

B) Solve the following:

6

- a) Explain process of vulcanization of natural rubber with suitable reactions.
- b) What are the number average and weight average molecular weight for a polymer having following composition.

100 molecules of molecular wt. 2×10^5 g/mole 300 molecules of molecular wt. 3×10^5 g/mole 400 molecules of molecular wt. 4×10^5 g/mole.

OR

- B) Solve the following:
 - a) Explain transfer moulding for plastic.
 - b) Degree of polymerization of polypropylene is 2×10^4 , calculate the mole wt. of polymer. (molecular wt. of propylene = 42 gm).

Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 **ENGINEERING PHYSICS**

Day and Date: Wednesday, 21-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if **necessary**.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each guestion carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

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

SECTION - I

1.	1) N-type semiconductor is formed by adding impurity elements of valency				14
	a) 3	b) 4	c) 5	d) 6	
	2) The band gap	energy of Ge is app	roximately		
	a) 0.3 eV	b) 0.7 eV	c) 1.1 eV	d) 3.8 eV	

- 3) The relation of angle between axes for a tetragonal crystal system is
 - a) $\alpha = \beta = \gamma = 90^{\circ}$

b) $\alpha \neq \beta \neq \gamma \neq 90^{\circ}$

c) $\alpha = 120^{\circ}, \beta = \gamma = 90^{\circ}$

- d) $\alpha = 90^{\circ}$, $\beta = \gamma = 120^{\circ}$
- 4) Total axes of symmetry for cubic structure is

a) 3

b) 6

c) 9

d) 13

5) The rod used in magnetostriction method for the production of ultrasonic waves is made up of

a) Nickel

b) Copper

c) Aluminium

d) Nichrome



- 6) Einstein's mass energy relation ($E = mc^2$) shows that
 - a) Mass disappears to reappear as energy
 - b) Energy disappears to reappear as mass
 - c) Mass and energy are two different forms of the same entity
 - d) All the above statements are correct
- 7) The persistence of audible sound after the source has stopped to emit sound is known as
 - a) Echo

b) Reverberation

c) Reflection

d) Magnetostriction effect

SECTION - II

- 8) The resolving power of a grating is
 - a) $\lambda/d\lambda$
- b) $nNd\lambda$
- c) $d\lambda/\lambda$
- d) n(n+1)
- 9) In a plane transmission grating, the condition for secondary maxima is
 - a) $(a + b) \sin \theta = n\lambda$

- b) $(a + b) \sin \theta = (2n 1) \cdot \lambda / 2$
- c) $(a + b) \sin \theta = (2n + 1) \cdot \lambda / 2$
- d) $(a b) \sin \theta = (2n 1)2. \lambda/2$
- 10) The stimulated absorption process is mathematically represented as
 - a) $A + h^{\gamma} \rightarrow A^*$

b) $A^* + h^{\gamma} \rightarrow 2h^{\gamma} + A$

c) $A^* \rightarrow A + h\gamma$

- d) $A^* + h\gamma \rightarrow A + h\gamma$
- 11) The wavelength of emission from He-Ne laser is
 - a) 10.64 µm
- b) 337.1 nm
- c) 694.3 nm
- d) 632.8 nm
- 12) The end at which light enters the fiber is known as
 - a) Acceptance cone

b) Acceptance angle

c) Incident corner

- d) Launching end
- 13) Chirality of Armchair CNT is
 - a) (a, 0)
- b) (a, a)
- c) (a, b)
- d) (0, b)

- 14) In nuclear reactor, moderator is used
 - a) To increase velocity of neutron
 - b) To slow down the fast neutrons
 - c) To absorb the neutron
 - d) To transfer the energy from core to heat exchanger



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if necessary.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Attempt any five of the following:

15

- a) Explain effect of impurity concentration on the position of Fermi level in N and P type semiconductors.
- b) Determine the number of atoms per unit cell and atomic radius of FCC lattice.
- c) Explain any three applications of ultrasonic waves.
- d) Deduce an expression for length contraction.
- e) Explain Bragg's Law.
- f) The mean life π meson is 2×10^{-08} sec. Calculate the mean life of a meson moving with a velocity of 0.8 c.
- g) The R_H of a specimen is 3.66×10^{-4} m³/C. Its resistivity is 8.93×10^{-3} Ω m. Find the mobility and density of charge carriers.
- 3. Define Miller indices of a crystal plane. Show that in a cubic crystal the spacing between consecutive parallel planes of miller indices (hkl) is given by $b = a/\sqrt{(h^2 + k^2 + l^2)}$.

4. Attempt any two of the following:

8

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Deduce the expression for relativistic mass variation, to show $m = m_0/(1-v^2/c^2)^{1/2}.$



SECTION - II

5. Attempt any five of the following:

15

- a) Explain: (i) Stimulated Emission (ii) Population Inversion.
- b) Write note on double refraction phenomenon.
- c) Write applications of LASER in different fields.
- d) Explain types of carbon nanotubes (CNT) on the basis of chirality.
- e) Explain with neat diagram principle of optical fibre.
- f) Determine acceptance angle, numerical aperture and critical angle of the optical fibre having refractive index of core 1.48 and that of cladding is 1.44.
- g) Find the angle of second order diffraction for the source of light having wavelength 5000 A.U. The number of lines/cm on the grating surface is 6000.
- 6. Explain the essential features for the design and working of a nuclear fission reactor.

5

OR

Explain theory of diffraction grating in short. Derive an expression for the resolving power of a plane diffraction grating.

7. Attempt any two of the following:

- a) What do you mean by thermonuclear reaction? Also explain Proton-Proton and Carbon-Nitrogen cycle.
- b) Write applications of fibre optics in different fields.
- c) Write note on holography.

Seat	
No.	

Set Q

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if **necessary**.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

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

SECTION - I

1	11	The relation of angle between axes for a tetragonal crystal system is	1/
Ι.	1)	THE TELATION OF ANUIT DELIVEEN AXES TO A LEGICAUDITAL CIVSTAL SYSTEM IS	14
	,		

a) $\alpha = \beta = \gamma = 90^{\circ}$

- b) $\alpha \neq \beta \neq \gamma \neq 90^{\circ}$
- c) $\alpha = 120^{\circ}$, $\beta = \gamma = 90^{\circ}$
- d) $\alpha = 90^{\circ}$, $\beta = \gamma = 120^{\circ}$
- 2) Total axes of symmetry for cubic structure is
 - a) 3
- b) 6
- c) 9
- d) 13
- 3) The rod used in magnetostriction method for the production of ultrasonic waves is made up of
 - a) Nickel
- b) Copper
- c) Aluminium
- d) Nichrome
- 4) Einstein's mass energy relation ($E = mc^2$) shows that
 - a) Mass disappears to reappear as energy
 - b) Energy disappears to reappear as mass
 - c) Mass and energy are two different forms of the same entity
 - d) All the above statements are correct



5)	The persistence of audible sound afte is known as a) Echo	the source has stopped to emit sound b) Reverberation
	c) Reflection	d) Magnetostriction effect
6)	N-type semiconductor is formed by aca a) 3 b) 4	dding impurity elements of valency c) 5 d) 6
7)	The band gap energy of Ge is approxi a) 0.3 eV b) 0.7 eV	mately c) 1.1 eV d) 3.8 eV
	SECTIO	N – II
8)	The stimulated absorption process is a) A + h γ \rightarrow A* c) A* \rightarrow A + h γ	mathematically represented as b) $A^* + h\gamma \rightarrow 2h\gamma + A$ d) $A^* + h\gamma \rightarrow A + h\gamma$
9)	The wavelength of emission from Hea) 10.64 μ m b) 337.1 nm	
10)	The end at which light enters the fibera) Acceptance cone c) Incident corner	is known as b) Acceptance angle d) Launching end
11)	Chirality of Armchair CNT is a) (a, 0) b) (a, a)	c) (a, b) d) (0, b)
12)	In nuclear reactor, moderator is used a) To increase velocity of neutron b) To slow down the fast neutrons c) To absorb the neutron d) To transfer the energy from core to	heat exchanger
13)	The resolving power of a grating is a) $\lambda / d\lambda$ b) $nNd\lambda$	c) $d\lambda/\lambda$ d) $n(n+1)$
14)	In a plane transmission grating, the can a) $(a + b) \sin \theta = n\lambda$ c) $(a + b) \sin \theta = (2n + 1).\lambda/2$	ondition for secondary maxima is b) $(a + b) \sin \theta = (2n - 1) \cdot \lambda/2$ d) $(a - b) \sin \theta = (2n - 1)2 \cdot \lambda/2$



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if necessary.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Attempt any five of the following:

15

- a) Explain effect of impurity concentration on the position of Fermi level in N and P type semiconductors.
- b) Determine the number of atoms per unit cell and atomic radius of FCC lattice.
- c) Explain any three applications of ultrasonic waves.
- d) Deduce an expression for length contraction.
- e) Explain Bragg's Law.
- f) The mean life π meson is 2 × 10⁻⁰⁸ sec. Calculate the mean life of a meson moving with a velocity of 0.8 c.
- g) The R_H of a specimen is 3.66×10^{-4} m³/C. Its resistivity is 8.93×10^{-3} Ω m. Find the mobility and density of charge carriers.
- 3. Define Miller indices of a crystal plane. Show that in a cubic crystal the spacing between consecutive parallel planes of miller indices (hkl) is given by $b = a/\sqrt{(h^2 + k^2 + l^2)}$.

4. Attempt any two of the following:

8

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Deduce the expression for relativistic mass variation, to show $m = m_0/(1-v^2/c^2)^{1/2}.$



SECTION - II

5. Attempt any five of the following:

15

- a) Explain: (i) Stimulated Emission (ii) Population Inversion.
- b) Write note on double refraction phenomenon.
- c) Write applications of LASER in different fields.
- d) Explain types of carbon nanotubes (CNT) on the basis of chirality.
- e) Explain with neat diagram principle of optical fibre.
- f) Determine acceptance angle, numerical aperture and critical angle of the optical fibre having refractive index of core 1.48 and that of cladding is 1.44.
- g) Find the angle of second order diffraction for the source of light having wavelength 5000 A.U. The number of lines/cm on the grating surface is 6000.
- 6. Explain the essential features for the design and working of a nuclear fission reactor.

5

OR

Explain theory of diffraction grating in short. Derive an expression for the resolving power of a plane diffraction grating.

7. Attempt any two of the following:

- a) What do you mean by thermonuclear reaction? Also explain Proton-Proton and Carbon-Nitrogen cycle.
- b) Write applications of fibre optics in different fields.
- c) Write note on holography.

Seat No. Set	R
--------------	---

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Total Marks: 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if **necessary**.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

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

SECTION - I

1.	1) The rod used in magnetostriction method for the production of ultrasonic					
	waves is made	up of			14	
	a) Nickel	b) Copper	c) Aluminium	d) Nichrome		

- 2) Einstein's mass energy relation ($E = mc^2$) shows that
 - a) Mass disappears to reappear as energy
 - b) Energy disappears to reappear as mass
 - c) Mass and energy are two different forms of the same entity
 - d) All the above statements are correct
- 3) The persistence of audible sound after the source has stopped to emit sound is known as
 - a) Echo

b) Reverberation

c) Reflection

d) Magnetostriction effect

4) N-type semiconductor is formed by adding impurity elements of valency

- a) 3
- b) 4
- c) 5
- d) 6

5) The band gap energy of Ge is approximately



	a) 0.3 eV	b) 0.7 eV	c)	1.1 eV	d)	3.8 eV
6)	The relation of ang a) $\alpha = \beta = \gamma = 90^{\circ}$ c) $\alpha = 120^{\circ}$, $\beta = \gamma =$		b)	tetragonal cryst $\alpha \neq \beta \neq \gamma \neq 90^{\circ}$ $\alpha = 90^{\circ}, \beta = \gamma =$)	
7)	Total axes of symra) 3	netry for cubic stru b) 6	ctu		d)	13
		SECTIO	N -	- II		
8)	The end at which li a) Acceptance con c) Incident corner	-	b)	known as Acceptance and Launching end	gle	
9)	Chirality of Armchaa) (a, 0)		c)	(a, b)	d)	(0, b)
10)	In nuclear reactor, a) To increase velo b) To slow down th c) To absorb the no d) To transfer the	ocity of neutron ne fast neutrons eutron	o he	eat exchanger		
11)	The resolving power	er of a grating is				
	a) $\lambda / d\lambda$	b) $nNd\lambda$	c)	$d\lambda/\lambda$	d)	n(n + 1)
12)	In a plane transmis a) $(a + b) \sin \theta = n$ c) $(a + b) \sin \theta = 0$	λ	b)	$(a+b)\sin\theta=($	2n -	– 1). λ/2
13)	The stimulated abs a) $A + h\gamma \rightarrow A^*$ c) $A^* \rightarrow A + h\gamma$	orption process is	b)	thematically rep $A^* + h \gamma \rightarrow 2h \gamma$ $A^* + h \gamma \rightarrow A + \beta \gamma$	+ /	
14)	The wavelength of a) 10.64 μ m	emission from He- b) 337.1 nm			d)	632.8 nm



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if **necessary**.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Attempt any five of the following:

15

- a) Explain effect of impurity concentration on the position of Fermi level in N and P type semiconductors.
- b) Determine the number of atoms per unit cell and atomic radius of FCC lattice.
- c) Explain any three applications of ultrasonic waves.
- d) Deduce an expression for length contraction.
- e) Explain Bragg's Law.
- f) The mean life π meson is 2 × 10⁻⁰⁸ sec. Calculate the mean life of a meson moving with a velocity of 0.8 c.
- g) The R_H of a specimen is 3.66×10^{-4} m³/C. Its resistivity is 8.93×10^{-3} Ω m. Find the mobility and density of charge carriers.
- 3. Define Miller indices of a crystal plane. Show that in a cubic crystal the spacing between consecutive parallel planes of miller indices (hkl) is given by $b = a/\sqrt{(h^2 + k^2 + l^2)}$.

4. Attempt any two of the following:

8

5

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Deduce the expression for relativistic mass variation, to show $m = m_0/(1-v^2/c^2)^{1/2}.$

Set R



SECTION - II

5. Attempt any five of the following:

15

- a) Explain: (i) Stimulated Emission (ii) Population Inversion.
- b) Write note on double refraction phenomenon.
- c) Write applications of LASER in different fields.
- d) Explain types of carbon nanotubes (CNT) on the basis of chirality.
- e) Explain with neat diagram principle of optical fibre.
- f) Determine acceptance angle, numerical aperture and critical angle of the optical fibre having refractive index of core 1.48 and that of cladding is 1.44.
- g) Find the angle of second order diffraction for the source of light having wavelength 5000 A.U. The number of lines/cm on the grating surface is 6000.
- 6. Explain the essential features for the design and working of a nuclear fission reactor.

5

OR

Explain theory of diffraction grating in short. Derive an expression for the resolving power of a plane diffraction grating.

7. Attempt any two of the following:

- a) What do you mean by thermonuclear reaction? Also explain Proton-Proton and Carbon-Nitrogen cycle.
- b) Write applications of fibre optics in different fields.
- c) Write note on holography.

Seat	
No.	

Set S

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING PHYSICS

Day and Date : Wednesday, 21-12-2016 Total Marks : 70

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if **necessary**.

- 2) Figures to the right indicate full marks.
- 3) Q. No. 1 is compulsory. It should be solved in first 30 minutes in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

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

SECTION - I

			OLO	TION-I	
1.	1)	The persistence of is known as	audible sound afte	r the source has sto	pped to emit sound
		a) Echo		b) Reverberation	
		c) Reflection		d) Magnetostriction	on effect
	2)	N-type semicondu a) 3	ctor is formed by a b) 4	dding impurity elen c) 5	nents of valency d) 6
	3)	The band gap ene a) 0.3 eV	rgy of Ge is approx b) 0.7 eV	imately c) 1.1 eV	d) 3.8 eV
	4)	The relation of ang		or a tetragonal crys	•

a)
$$\alpha = \beta = \gamma = 90^{\circ}$$

b)
$$\alpha \neq \beta \neq \gamma \neq 90^{\circ}$$

c)
$$\alpha = 120^{\circ}$$
, $\beta = \gamma = 90^{\circ}$

d)
$$\alpha = 90^{\circ}$$
, $\beta = \gamma = 120^{\circ}$

5) Total axes of symmetry for cubic structure is

- a) 3
- b) 6
- c) 9
- d) 13



6)	The rod used in magnetostriction method for the production of ultrasor waves is made up of					on of ultrasonic
	a) Nickel	b) Copper	c)	Aluminium	d)	Nichrome
7)	Einstein's mass en a) Mass disappear b) Energy disappe c) Mass and energ d) All the above sta	rs to reappear as e ars to reappear as gy are two different	ner ma t for	gy iss	ent	iity
		SECTIO	N -	-		
8)	In nuclear reactor, a) To increase velo b) To slow down th c) To absorb the no d) To transfer the o	ocity of neutron ne fast neutrons eutron	o he	eat exchanger		
9)	The resolving power	er of a grating is				
	a) $\lambda / d\lambda$	b) $nNd\lambda$	c)	$d\lambda/\lambda$	d)	n(n + 1)
10)	In a plane transmis a) $(a + b) \sin \theta = n$ c) $(a + b) \sin \theta = (2a)$	λ	b)	$(a + b) \sin \theta = ($	2n	– 1). λ /2
11)	The stimulated abs a) $A + h\gamma \rightarrow A^*$ c) $A^* \rightarrow A + h\gamma$	orption process is	b)	thematically rep $A^* + h \gamma \rightarrow 2h \gamma$ $A^* + h \gamma \rightarrow A + \beta$	+ /	
12)	The wavelength of a) $10.64 \mu m$	emission from He- b) 337.1 nm			d)	632.8 nm
13)	The end at which lip a) Acceptance con c) Incident corner	~	b)	known as Acceptance and Launching end	gle	
14)	Chirality of Armchaa) (a, 0)		c)	(a, b)	d)	(0, b)



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING PHYSICS

Day and Date: Wednesday, 21-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

Instructions: 1) Make suitable assumptions, if necessary.

2) Figures to the **right** indicate **full** marks.

SECTION - I

2. Attempt any five of the following:

15

- a) Explain effect of impurity concentration on the position of Fermi level in N and P type semiconductors.
- b) Determine the number of atoms per unit cell and atomic radius of FCC lattice.
- c) Explain any three applications of ultrasonic waves.
- d) Deduce an expression for length contraction.
- e) Explain Bragg's Law.
- f) The mean life π meson is 2×10^{-08} sec. Calculate the mean life of a meson moving with a velocity of 0.8 c.
- g) The R_H of a specimen is 3.66×10^{-4} m³/C. Its resistivity is 8.93×10^{-3} Ω m. Find the mobility and density of charge carriers.
- 3. Define Miller indices of a crystal plane. Show that in a cubic crystal the spacing between consecutive parallel planes of miller indices (hkl) is given by $b = a/\sqrt{(h^2 + k^2 + l^2)}$.

4. Attempt any two of the following:

8

- a) Show that Fermi level in an intrinsic semiconductor lies half way between a valence band and conduction band.
- b) State the acoustic requirements of a good auditorium. Explain how these requirements can be achieved.
- c) Deduce the expression for relativistic mass variation, to show $m = m_0/(1-v^2/c^2)^{1/2}.$



SECTION - II

5. Attempt any five of the following:

15

- a) Explain: (i) Stimulated Emission (ii) Population Inversion.
- b) Write note on double refraction phenomenon.
- c) Write applications of LASER in different fields.
- d) Explain types of carbon nanotubes (CNT) on the basis of chirality.
- e) Explain with neat diagram principle of optical fibre.
- f) Determine acceptance angle, numerical aperture and critical angle of the optical fibre having refractive index of core 1.48 and that of cladding is 1.44.
- g) Find the angle of second order diffraction for the source of light having wavelength 5000 A.U. The number of lines/cm on the grating surface is 6000.
- 6. Explain the essential features for the design and working of a nuclear fission reactor.

5

OR

Explain theory of diffraction grating in short. Derive an expression for the resolving power of a plane diffraction grating.

7. Attempt **any two** of the following:

- a) What do you mean by thermonuclear reaction? Also explain Proton-Proton and Carbon-Nitrogen cycle.
- b) Write applications of fibre optics in different fields.
- c) Write note on holography.

Seat No.	Set	D
	J Set	

F.E. (Part – I/II) (CGPA) Examination, 2016

	(.	ENGINEERING	G CHEMISTRY	., 2010
-	d Date : Friday, 23- 10.00 a.m. to 1.00			Total Marks : 70
	i. 2) A	n Answer Book Pa Answer MCQ/Obj	age No. 3. Each qu ective type quest	solved in first 30 minutes lestion carries one mark. i ons on Page No. 3 only. I/Q/R/S) on Top of Page.
Duratio	on : 30 Minutes	MCQ/Objective	Type Questions	Marks: 14
1 Ch	oose the correct ar	nswer :		(14×1=14)
	Aerobic oxidation			()
• ,	A) Aerobic bacter	•	excess of 02	
	B) Anaerobic bac	•		
C) Aerobic bacterias in absence of 02				
	D) None of these			
2)	A semipermeable	membrane allow	the flow of	
,	A) Solvent molecu	ules	B) Solute mole	cules
	C) Both A and B		D) None of the	se
3)	A system consists	of water in contac	t with its vapour, th	e degree of freedom is
	A) Zero	B) One	C) Two	D) Three
4)	Machine operating	at high temperatu	res and high loads	s are best lubricated by
	A) Mineral oils		B) Solid Lubric	ants
	C) Greases		D) Animal oils	
5)	In Ag-Pb system, are	at the Eutectic Po	int, the number of	phases at equilibrium
	A) One	B) Two	C) Three	D) Zero
6)	Corrosion is an ex	ample of		
	A) Oxidation	B) Reduction	C) Electrolysis	D) Erosion
7)	Drying oils supply	to paint film		
	A) Water Proofne	SS	B) Medium or \	/ehicle
	C) Main film forming constituent		D) All of these	



8)) Analysis of sulphur in coal is carried out by					
	A) Proximate analy	ysis	B)	Ultimate analys	sis	
	C) Volumetric anal	ysis	D)	None of these		
9)	The purest comme	rcial form of iron is	3			
	A) Cast iron	B) Steel	C)	Wrought iron	D)	Stainless steel
10)	An alloy having high	electrical resistance	an	d can be used in h	neat	ing appliances is
	A) Duralumin	B) Brass	C)	Stainless steel	D)	Nichrome
11)	An organic polymer	shows appreciabl	e co	onductivity if poly	/me	r chain contains
	A) Conjugation		B)	Only single bor	ıd	
	C) Only double bor	nd	D)	Functional grou	р	
12)	The most widely us	sed vulcanizing ag	ent	is		
	A) Ozone	B) Sulphur	C)	Chlorine	D)	Phosphorous
13)	What is the normal	ity of 1 litre solutio	n co	ontaining 40 gm	of I	NaOH ?
	A) 1 N	B) 4 N	C)	2 N	D)	0.1 N
14)	The detection of st	eroid drugs used b	y a	thletes can be c	arri	ed out by
	A) TGA	B) DTA	C)	DSC	D)	GLC

Set P



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: i) Attempt all questions.

- ii) Draw neat diagrams wherever necessary.
- iii) Figures to right indicate full marks.

SECTION-I

2. A) Attempt any two:

8

a) A sample of water on analysis has been found to contain the following impurities in ppm as

Impurities	Amount	Mole. Wt.
$Ca(HCO_3)_2$	8.50	162
$Mg(HCO_3)_2$	10.30	146
CaCl ₂	4.93	111
Mg SŌ₄	2.50	120

Calculate temporary, permanent and total hardness of water.

- b) Define aeration. Explain surface and gravity aerators with suitable diagram.
- c) Draw and explain the important features of phase diagram of one component water system.

B) Attempt any two:

6

- a) Define lubrication. Explain fluid film lubrication in detail.
- b) Give an account of cathodic protection of corrosion by sacrificial anodic method.
- c) Select the lubricant for:
 - i) Cutting tools
 - ii) Transformers
 - iii) Internal combustion engine.

3. A) Attempt any two:

6

- a) Explain scales and sludge formation in boilers with its prevention measures.
- b) Write a note on Galvanizing.
- c) Define with examples:
 - i) Reduced phase rule
 - ii) Component
 - iii) Degree of freedom.

Set P

Set P

	B)	Att	rempt any two :	8
		a)	Write a note on co-agulation of H ₂ O.	
		b)	Discuss the following as a lubricants:	
			i) Animal and vegetable oils ii) Mineral oils.	
		c)	Discuss the mechanism of wet corrosion by :	
			i) Hydrogen evolution method ii) Oxygen absorption method.	
			SECTION - II	
4.	A)	At	tempt any two :	8
		a)	Explain steps of setting and hardening of portland cement with chemical reactions.	
		b)	Calculate HCV and LCV of a coal sample having the following composition $C=75\%,O=5\%,H=6\%,S=0.8\%,N=3\%,ash=10.2\%$	
			Take latent heat of steam = 540 Kcal/Kg	
		c)	Explain isolation of natural rubber from latex.	
	B)	At	tempt any two :	6
		a)	Draw a labelled block diagram of GLC.	
		b)	Distinguish between addition and condensation polymerization.	
		c)	Define	
			i) Calorific value ii) Polymerization iii) TGA.	
5.	A)	i)	Write compound constituents of portland cement.	3
		ii)	What are advantages and disadvantages of gaseous fuel or solid fuel?	3
			OR	
	A)	i)	What is the weight of MgSO ₄ required to prepare 0.5 N solution of 750 ml? (Mole. Wt. of MgSO ₄ = 120)	3
		ii)	Write a note on polymers in medicine and surgery.	3
	B)	At	tempt any two :	8
		i)	Explain construction and working of bomb calorimeter.	4
		ii)	Explain composition, properties and applications of different varieties of	
			steel.	4
		iii)	 a) Calculate the molecular weight of polymer having D.P. = 4500, where molecular weight of monomer is 56. 	2
			b) Give properties and uses of two types of glass.	2

Seat No.	Set	Q

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING CHEMISTRY

ÈNG	ÉERING CHEMISTRY	
Day and Date: Friday, 23-12-201	Total Marks : 7	70
Time: 10.00 a.m. to 1.00 p.m.		
in Answei 2) Answe i	s compulsory. It should be solved in first 30 minutes and Book Page No. 3. Each question carries one mark. If CQ/Objective type questions on Page No. 3 only. If get to mention, Q.P. Set (P/Q/R/S) on Top of Page.	
MCQ Duration: 30 Minutes	bjective Type Questions Marks : 1	14
Choose the correct answer :	(14×1=1	۵۱
Analysis of sulphur in co		ч,
A) Proximate analysis	B) Ultimate analysis	
,	D) None of these	
2) The purest commercial for	•	
	el C) Wrought iron D) Stainless steel	
,	Il resistance and can be used in heating appliances is	
	ss C) Stainless steel D) Nichrome	
·	appreciable conductivity if polymer chain contains	
A) Conjugation	B) Only single bond	
C) Only double bond	D) Functional group	
5) The most widely used vu	anizing agent is	
A) Ozone B) S	ohur C) Chlorine D) Phosphorous	
6) What is the normality of	itre solution containing 40 gm of NaOH ?	
A) 1 N B) 4	C) 2 N D) 0.1 N	
7) The detection of steroid of	ugs used by athletes can be carried out by	
A) TGA B) D	A C) DSC D) GLC	
8) Aerobic oxidation is caus	d by	
A) Aerobic bacterias in p	sence of excess of 02	
B) Anaerobic bacterias i	presence of insufficient 02	
C) Aerobic bacterias in a	sence of 02	
D) None of these		

-2-



9) A semipermeable membrane allow the flow of					
A)	Solvent molecul	es	B)	Solute molecul	es
C)	Both A and B		D)	None of these	
10) A	system consists o	of water in contact	with	its vapour, the o	degree of freedom is
A)	Zero	B) One	C)	Two	D) Three
11) Ma	achine operating	at high temperatur	es a	and high loads a	re best lubricated by
A)	Mineral oils		B)	Solid Lubricant	is
C)	Greases		D)	Animal oils	
•		t the Eutectic Poir	nt, th	ne number of ph	nases at equilibrium
are	е				
A)	One	B) Two	C)	Three	D) Zero
13) Co	orrosion is an exa	ample of			
A)	Oxidation	B) Reduction	C)	Electrolysis	D) Erosion
14) Dr	ying oils supply t	to paint film			
A)	Water Proofnes	S	B)	Medium or Veh	nicle
C)	Main film formin	g constituent	D)	All of these	

Set Q



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: i) Attempt all questions.

- ii) Draw neat diagrams wherever necessary.
- iii) Figures to right indicate full marks.

SECTION-I

2. A) Attempt any two:

8

a) A sample of water on analysis has been found to contain the following impurities in ppm as

Impurities	Amount	Mole. Wt.
Ca(HCO ₃) ₂	8.50	162
$Mg(HCO_3)_2$	10.30	146
CaCl ₂	4.93	111
Mg SO _₄	2.50	120

Calculate temporary, permanent and total hardness of water.

- b) Define aeration. Explain surface and gravity aerators with suitable diagram.
- c) Draw and explain the important features of phase diagram of one component water system.

B) Attempt any two:

6

- a) Define lubrication. Explain fluid film lubrication in detail.
- b) Give an account of cathodic protection of corrosion by sacrificial anodic method.
- c) Select the lubricant for:
 - i) Cutting tools
 - ii) Transformers
 - iii) Internal combustion engine.

3. A) Attempt any two:

6

- a) Explain scales and sludge formation in boilers with its prevention measures.
- b) Write a note on Galvanizing.
- c) Define with examples:
 - i) Reduced phase rule
 - ii) Component
 - iii) Degree of freedom.

Set Q



Set Q

	B)	Att	tempt any two :	8
		a)	Write a note on co-agulation of H ₂ O.	
		b)	Discuss the following as a lubricants:	
			i) Animal and vegetable oils ii) Mineral oils.	
		c)	Discuss the mechanism of wet corrosion by :	
			i) Hydrogen evolution method ii) Oxygen absorption method.	
			SECTION - II	
4.	A)	At	tempt any two :	8
		a)	Explain steps of setting and hardening of portland cement with chemical reactions.	
		b)	Calculate HCV and LCV of a coal sample having the following composition $C=75\%,O=5\%,H=6\%,S=0.8\%,N=3\%,ash=10.2\%$	
			Take latent heat of steam = 540 Kcal/Kg	
		c)	Explain isolation of natural rubber from latex.	
	B)	Att	tempt any two :	6
		a)	Draw a labelled block diagram of GLC.	
		b)	Distinguish between addition and condensation polymerization.	
		c)	Define	
			i) Calorific value ii) Polymerization iii) TGA.	
5.	A)	i)	Write compound constituents of portland cement.	3
	•	ii)	What are advantages and disadvantages of gaseous fuel or solid fuel?	3
			OR	
	A)	i)	What is the weight of $MgSO_4$ required to prepare 0.5 N solution of 750 ml? (Mole. Wt. of $MgSO_4$ = 120)	3
		ii)	Write a note on polymers in medicine and surgery.	3
	B)	At	tempt any two :	8
		i)	Explain construction and working of bomb calorimeter.	4
		ii)	Explain composition, properties and applications of different varieties of steel.	4
		iii)	 a) Calculate the molecular weight of polymer having D.P. = 4500, where molecular weight of monomer is 56. 	2
			b) Give properties and uses of two types of glass.	2

A) Ozone

B) Sulphur

C) Chlorine

SLR-EP - 377

Seat	·	
No.	Set	R

	•	ENGINEERING	•	•	201	ь	
-	d Date : Friday, 23-1 10.00 a.m. to 1.00 p					Total Marks:	70
	in 2) A	D. No. 1 is compuls Answer Book Pag nswer MCQ/Object on't forget to mer	ge N ctiv	lo. 3 . Each ques e type question	tion s o i	carries one mark n Page No. 3 only	Κ. /-
Duratio	on : 30 Minutes	MCQ/Objective T	уре	Questions		Marks :	14
1. Ch	oose the correct an	swer:				(14×1=	14)
1)	In Ag-Pb system, a are	t the Eutectic Poir	nt, th	ne number of ph	ase	es at equilibrium	
	A) One	B) Two	C)	Three	D)	Zero	
2)	Corrosion is an exa	ample of					
	A) Oxidation	B) Reduction	C)	Electrolysis	D)	Erosion	
3)	Drying oils supply	to paint film					
	A) Water Proofnes	s	B)	Medium or Veh	icle		
	C) Main film forming	g constituent	D)	All of these			
4)	Analysis of sulphur	r in coal is carried	out	by			
	A) Proximate analy	ysis	•	Ultimate analys	sis		
	C) Volumetric anal	-	•	None of these			
5)	The purest comme						
_,	A) Cast iron	B) Steel	,	Wrought iron	,	Stainless steel	
6)	An alloy having high						
- \	A) Duralumin	B) Brass	,	Stainless steel	,		
7)	An organic polymer	r shows appreciabl				r chain contains	
	A) Conjugation	الم	-	Only single bor			
0/	C) Only double bor		•	Functional grou	p		
გ)	The most widely us	seu vuicanizing ag	ent	IS .			

D) Phosphorous

-2-



9)	What is the normal	lity of 1 litre solutio	n containing 40 gm	of NaOH?
	A) 1 N	B) 4 N	C) 2 N	D) 0.1 N
10)	The detection of st	eroid drugs used b	y athletes can be c	carried out by
	A) TGA	B) DTA	C) DSC	D) GLC
11)	Aerobic oxidation i	s caused by		
	A) Aerobic bacteri	as in presence of ϵ	excess of 02	
	B) Anaerobic bact	erias in presence d	of insufficient 02	
	C) Aerobic bacteria	as in absence of 02	2	
	D) None of these			
12)	A semipermeable r	membrane allow th	e flow of	
	A) Solvent molecu	les	B) Solute molecul	es
	C) Both A and B		D) None of these	
13)	A system consists of	of water in contact v	with its vapour, the c	degree of freedom is
	A) Zero	B) One	C) Two	D) Three
14)	Machine operating	at high temperature	es and high loads a	re best lubricated by
	A) Mineral oils		B) Solid Lubricant	ts
	C) Greases		D) Animal oils	



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: i) Attempt all questions.

- ii) Draw neat diagrams wherever necessary.
- iii) Figures to right indicate full marks.

SECTION-I

2. A) Attempt any two:

8

a) A sample of water on analysis has been found to contain the following impurities in ppm as

Impurities	Amount	Mole. Wt
Ca(HCO ₃) ₂	8.50	162
$Mg(HCO_3)_2$	10.30	146
CaCl ₂	4.93	111
Mg SŌ₄	2.50	120

Calculate temporary, permanent and total hardness of water.

- b) Define aeration. Explain surface and gravity aerators with suitable diagram.
- c) Draw and explain the important features of phase diagram of one component water system.

B) Attempt any two:

6

- a) Define lubrication. Explain fluid film lubrication in detail.
- b) Give an account of cathodic protection of corrosion by sacrificial anodic method.
- c) Select the lubricant for:
 - i) Cutting tools
 - ii) Transformers
 - iii) Internal combustion engine.

3. A) Attempt any two:

6

- a) Explain scales and sludge formation in boilers with its prevention measures.
- b) Write a note on Galvanizing.
- c) Define with examples:
 - i) Reduced phase rule
 - ii) Component
 - iii) Degree of freedom.

Set R

Set R

	B)	Att	rempt any two :	8
		a)	Write a note on co-agulation of H ₂ O.	
		b)	Discuss the following as a lubricants:	
			i) Animal and vegetable oils ii) Mineral oils.	
		c)	Discuss the mechanism of wet corrosion by:	
			i) Hydrogen evolution method ii) Oxygen absorption method.	
			SECTION-II	
4.	A)	Att	tempt any two :	8
		a)	Explain steps of setting and hardening of portland cement with chemical reactions.	
		b)	Calculate HCV and LCV of a coal sample having the following composition $C=75\%,\ O=5\%,\ H=6\%,\ S=0.8\%,\ N=3\%,\ ash=10.2\%$	
			Take latent heat of steam = 540 Kcal/Kg	
		c)	Explain isolation of natural rubber from latex.	
	B)	At	tempt any two :	6
		a)	Draw a labelled block diagram of GLC.	
		-	Distinguish between addition and condensation polymerization.	
		c)	Define	
			i) Calorific value ii) Polymerization iii) TGA.	
5.	A)	i)	Write compound constituents of portland cement.	3
		ii)	What are advantages and disadvantages of gaseous fuel or solid fuel?	3
			OR	
	A)	i)	What is the weight of $MgSO_4$ required to prepare 0.5 N solution of 750 ml? (Mole. Wt. of $MgSO_4$ = 120)	3
		ii)	Write a note on polymers in medicine and surgery.	3
	B)	At	tempt any two :	8
		i)	Explain construction and working of bomb calorimeter.	4
		ii)	Explain composition, properties and applications of different varieties of steel.	4
		iii)	a) Calculate the molecular weight of polymer having D.P. = 4500, where molecular weight of monomer is 56.	2
			b) Give properties and uses of two types of glass.	2

Seat No.	1 _ I
_ 110. Se	S

	F.E	` , `	SPA) Examinatio NG CHEMISTRY	•
-	d Date : Friday, 10.00 a.m. to 1.0			Total Marks : 70
		in Answer Book I Answer MCQ/OI	Page No. 3. Each q bjective type ques t	solved in first 30 minutes uestion carries one mark. t ions on Page No. 3 only. P/Q/R/S) on Top of Page.
Duratio	on : 30 Minutes	MCQ/Objectiv	e Type Questions	Marks : 14
1. Ch	oose the correc	t answer :		(14×1=14)
1)	An alloy having h	nigh electrical resista	ance and can be used	d in heating appliances is
	A) Duralumin	B) Brass	C) Stainless st	eel D) Nichrome
2)	An organic poly	mer shows appreci	iable conductivity if	polymer chain contains
	A) Conjugation		B) Only single	bond
	C) Only double	bond	D) Functional (group
3)	The most widel	y used vulcanizing	agent is	
	A) Ozone	B) Sulphur	C) Chlorine	D) Phosphorous
4)	What is the nor	mality of 1 litre solu	ution containing 40	gm of NaOH?
	A) 1 N	B) 4 N	C) 2 N	D) 0.1 N
5)	The detection of	_	ed by athletes can b	e carried out by
	A) TGA	B) DTA	C) DSC	D) GLC
6)	Aerobic oxidati	_		
	•	terias in presence		
	•	•	ce of insufficient 02	
	,	terias in absence c	of 02	
_,	D) None of the			
7)	•	ole membrane allov		
	A) Solvent mol		B) Solute mole	
	C) Both A and I	В	D) None of the	se



8)	A system consists of	of water in contact v	with	its vapour, the d	legr	ee of freedom is
	A) Zero	B) One	C)	Two	D)	Three
9)	Machine operating	at high temperatur	es a	ınd high loads ar	e be	est lubricated by
	A) Mineral oils		B)	Solid Lubricant	S	
	C) Greases		D)	Animal oils		
10)	In Ag-Pb system, a are	t the Eutectic Poir	ıt, tł	ne number of ph	ase	s at equilibrium
	A) One	B) Two	C)	Three	D)	Zero
11)	1) Corrosion is an example of					
	A) Oxidation	B) Reduction	C)	Electrolysis	D)	Erosion
12)	Drying oils supply	to paint film				
	A) Water Proofnes	S	B)	Medium or Veh	icle	
	C) Main film forming	ng constituent	D)	All of these		
13)	Analysis of sulphur	r in coal is carried	out	by		
	A) Proximate analy	ysis	B)	Ultimate analys	sis	
	C) Volumetric anal	ysis	D)	None of these		
14)	The purest comme	ercial form of iron is	3			
	A) Cast iron	B) Steel	C)	Wrought iron	D)	Stainless steel



Seat	
No.	

F.E. (Part – I/II) (CGPA) Examination, 2016 ENGINEERING CHEMISTRY

Day and Date: Friday, 23-12-2016 Marks: 56

Time: 10.00 a.m. to 1.00 p.m.

N.B.: i) Attempt all questions.

- ii) Draw neat diagrams wherever necessary.
- iii) Figures to right indicate full marks.

SECTION-I

2. A) Attempt any two:

8

a) A sample of water on analysis has been found to contain the following impurities in ppm as

Impurities	Amount	Mole. Wt.
Ca(HCO ₃) ₂	8.50	162
$Mg(HCO_3)_2$	10.30	146
CaCl ₂	4.93	111
Mg SŌ₄	2.50	120

Calculate temporary, permanent and total hardness of water.

- b) Define aeration. Explain surface and gravity aerators with suitable diagram.
- c) Draw and explain the important features of phase diagram of one component water system.

B) Attempt any two:

6

- a) Define lubrication. Explain fluid film lubrication in detail.
- b) Give an account of cathodic protection of corrosion by sacrificial anodic method.
- c) Select the lubricant for:
 - i) Cutting tools
 - ii) Transformers
 - iii) Internal combustion engine.

3. A) Attempt any two:

6

- a) Explain scales and sludge formation in boilers with its prevention measures.
- b) Write a note on Galvanizing.
- c) Define with examples:
 - i) Reduced phase rule
 - ii) Component
 - iii) Degree of freedom.

Set S

Set S

	B)	Att	tempt any two :	8
			Write a note on co-agulation of H ₂ O.	
		b)	Discuss the following as a lubricants:	
			i) Animal and vegetable oils ii) Mineral oils.	
		C)	Discuss the mechanism of wet corrosion by:	
			i) Hydrogen evolution method ii) Oxygen absorption method.	
SECTION - II				
4.	A)	At	tempt any two :	8
		a)	Explain steps of setting and hardening of portland cement with chemical reactions.	
		b)	Calculate HCV and LCV of a coal sample having the following composition $C=75\%,O=5\%,H=6\%,S=0.8\%,N=3\%,ash=10.2\%$	
			Take latent heat of steam = 540 Kcal/Kg	
		c)	Explain isolation of natural rubber from latex.	
	B)	Att	tempt any two :	6
		a)	Draw a labelled block diagram of GLC.	
		b)	Distinguish between addition and condensation polymerization.	
		c)	Define	
			i) Calorific value ii) Polymerization iii) TGA.	
5.	A)	i)	Write compound constituents of portland cement.	3
		ii)	What are advantages and disadvantages of gaseous fuel or solid fuel?	3
			OR	
	A)	i)	What is the weight of MgSO ₄ required to prepare 0.5 N solution of 750 ml? (Mole. Wt. of MgSO ₄ = 120)	3
		ii)	Write a note on polymers in medicine and surgery.	3
	B)	At	tempt any two :	8
	,		Explain construction and working of bomb calorimeter.	4
		,	Explain composition, properties and applications of different varieties of	
		Í	steel.	4
		iii)	 a) Calculate the molecular weight of polymer having D.P. = 4500, where molecular weight of monomer is 56. 	2
			b) Give properties and uses of two types of glass.	2

SLR-EP - 601

Seat	
No.	

Set P

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Figures to the **right** indicate **full** marks.

- 2) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 3) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

- 1. Choose the correct answer:
 - I) Which is a characteristic of city?
 - a) Higher rate of unemployment
 - b) Based on agriculture
 - c) Small family size
 - d) Traditional nature of occupation
 - II) Which is not a characteristic of a tribe?
 - a) Common habitation
 - b) Sense of unity
 - c) Common origin
 - d) Different language
 - III) What do you mean by sex ratio?
 - a) No. of women per thousand
 - b) No. of women per hundred
 - c) Total no. of women
 - d) Total no. of men
 - IV) The term sociology was for the first time coined by
 - a) Auguste Comte
 - b) Ginsberg
 - c) Aristotle
 - d) Socrates



V)	Who has described society as a web of social relations? a) Cooley b) McIver c) Parsons d) Leacock
VI)	Communities and associations are types of a) Social group b) Aggregate c) Society d) Social category
VII)	The nature of urbanization is a) Pioneering b) Static c) Dynamic d) Homogeneous
VIII)	Who has been a pioneer of Narmada Bachao Andolan (Movement)? a) Anna Hazare b) Megha Patkar c) Sundarlal Bahuguna d) J. P. Narayan
IX)	Which one of the following you categorise as achieved status? a) Sex b) Age c) Caste d) Social worker
X)	The basic characteristics of caste system is a) Inequality b) Hierarchy c) Equal status d) Openness



Seat	
No.	

movements in India.

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 10-12-2016
Time: 10.00 a.m. to 12.00 noon

Instructions: I) Attempt any 4 from the following questions.

II) Figures to the right indicate full marks.

2. Define sociology and explain the concept of status.

10
3. Define concept of social mobility and elucidate types of social mobility.

10
4. What is population dividend? Explain its positive impact on society.

6. Discuss the key characteristics of industry as a formal organization. 10

5. What is social movement? Elucidate the significance of environmental

7. Define the concept of social institution and explain the functions of family institution. 10

SLR-EP - 601

Seat	
No.	

Set Q

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Figures to the **right** indicate **full** marks.

- 2) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 3) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

- 1. Choose the correct answer:
 - I) Which one of the following you categorise as achieved status?
 - a) Sex
 - b) Age
 - c) Caste
 - d) Social worker
 - II) The basic characteristics of caste system is
 - a) Inequality
 - b) Hierarchy
 - c) Equal status
 - d) Openness
 - III) The nature of urbanization is
 - a) Pioneering
 - b) Static
 - c) Dynamic
 - d) Homogeneous



- IV) Who has been a pioneer of Narmada Bachao Andolan (Movement)?
 - a) Anna Hazare
 - b) Megha Patkar
 - c) Sundarlal Bahuguna
 - d) J. P. Narayan
- V) Which is a characteristic of city?
 - a) Higher rate of unemployment
 - b) Based on agriculture
 - c) Small family size
 - d) Traditional nature of occupation
- VI) Which is not a characteristic of a tribe?
 - a) Common habitation
 - b) Sense of unity
 - c) Common origin
 - d) Different language
- VII) What do you mean by sex ratio?
 - a) No. of women per thousand
 - b) No. of women per hundred
 - c) Total no. of women
 - d) Total no. of men
- VIII) The term sociology was for the first time coined by
 - a) Auguste Comte
 - b) Ginsberg
 - c) Aristotle
 - d) Socrates
 - IX) Who has described society as a web of social relations?
 - a) Cooley
 - b) McIver
 - c) Parsons
 - d) Leacock
 - X) Communities and associations are types of
 - a) Social group
 - b) Aggregate
 - c) Society
 - d) Social category



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 10-12-2016 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: I) Attempt any 4 from the following questions.

II) Figures to the right indicate full marks.

2. Define sociology and explain the concept of status.

10

3. Define concept of social mobility and elucidate types of social mobility.

10

4. What is population dividend? Explain its positive impact on society.

5. What is social movement? Elucidate the significance of environmental movements in India.

6. Discuss the key characteristics of industry as a formal organization.

7. Define the concept of social institution and explain the functions of family institution. 10

SLR-EP - 601

Seat	
No.	

Set R

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Figures to the right indicate full marks.

- 2) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 3) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

- 1. Choose the correct answer:
 - I) Who has described society as a web of social relations?
 - a) Cooley
 - b) McIver
 - c) Parsons
 - d) Leacock
 - II) Communities and associations are types of
 - a) Social group
 - b) Aggregate
 - c) Society
 - d) Social category
 - III) Which one of the following you categorise as achieved status?
 - a) Sex
 - b) Age
 - c) Caste
 - d) Social worker



- IV) The basic characteristics of caste system is
 - a) Inequality
 - b) Hierarchy
 - c) Equal status
 - d) Openness
- V) What do you mean by sex ratio?
 - a) No. of women per thousand
 - b) No. of women per hundred
 - c) Total no. of women
 - d) Total no. of men
- VI) The term sociology was for the first time coined by
 - a) Auguste Comte
 - b) Ginsberg
 - c) Aristotle
 - d) Socrates
- VII) Which is a characteristic of city?
 - a) Higher rate of unemployment
 - b) Based on agriculture
 - c) Small family size
 - d) Traditional nature of occupation
- VIII) Which is not a characteristic of a tribe?
 - a) Common habitation
 - b) Sense of unity
 - c) Common origin
 - d) Different language
 - IX) The nature of urbanization is
 - a) Pioneering
 - b) Static
 - c) Dynamic
 - d) Homogeneous
 - X) Who has been a pioneer of Narmada Bachao Andolan (Movement)?
 - a) Anna Hazare
 - b) Megha Patkar
 - c) Sundarlal Bahuguna
 - d) J. P. Narayan



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Marks: 40 Day and Date: Saturday, 10-12-2016 Time: 10.00 a.m. to 12.00 noon **Instructions**: I) Attempt **any 4** from the following questions. II) Figures to the **right** indicate full marks. 2. Define sociology and explain the concept of status. 10 3. Define concept of social mobility and elucidate types of social mobility. 10 4. What is population dividend? Explain its positive impact on society. 10 5. What is social movement? Elucidate the significance of environmental movements in India. 10 6. Discuss the key characteristics of industry as a formal organization. 10 7. Define the concept of social institution and explain the functions of family institution. 10

SLR-EP - 601

Seat	
No.	

Set S

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Figures to the **right** indicate **full** marks.

- 2) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 3) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

- 1. Choose the correct answer:
 - I) What do you mean by sex ratio?
 - a) No. of women per thousand
 - b) No. of women per hundred
 - c) Total no. of women
 - d) Total no. of men
 - II) The term sociology was for the first time coined by
 - a) Auguste Comte
 - b) Ginsberg
 - c) Aristotle
 - d) Socrates
 - III) Who has described society as a web of social relations?
 - a) Cooley
 - b) McIver
 - c) Parsons
 - d) Leacock
 - IV) Communities and associations are types of
 - a) Social group
 - b) Aggregate
 - c) Society
 - d) Social category



- V) The nature of urbanization is
 - a) Pioneering
 - b) Static
 - c) Dynamic
 - d) Homogeneous
- VI) Who has been a pioneer of Narmada Bachao Andolan (Movement)?
 - a) Anna Hazare
 - b) Megha Patkar
 - c) Sundarlal Bahuguna
 - d) J. P. Narayan
- VII) Which one of the following you categorise as achieved status?
 - a) Sex
 - b) Age
 - c) Caste
 - d) Social worker
- VIII) The basic characteristics of caste system is
 - a) Inequality
 - b) Hierarchy
 - c) Equal status
 - d) Openness
 - IX) Which is a characteristic of city?
 - a) Higher rate of unemployment
 - b) Based on agriculture
 - c) Small family size
 - d) Traditional nature of occupation
 - X) Which is not a characteristic of a tribe?
 - a) Common habitation
 - b) Sense of unity
 - c) Common origin
 - d) Different language



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 SOCIOLOGY Introduction to Sociology (Self Learning) HSS

Day and Date: Saturday, 10-12-2016 Marks: 40 Time: 10.00 a.m. to 12.00 noon

Instructions: I) Attempt any 4 from the following questions.

2. Define sociology and explain the concept of status.

II) Figures to the **right** indicate full marks.

3. Define concept of social mobility and elucidate types of social mobility.

4. What is population dividend? Explain its positive impact on society.

5. What is social movement? Elucidate the significance of environmental movements in India.

6. Discuss the key characteristics of industry as a formal organization.

7. Define the concept of social institution and explain the functions of family institution. 10

1 10 10 10 10 10 10 10	SLR-EP - 602
Seat No.	Set P
	art – I) Examination, 2016 SIONAL ETHICS AND HUMAN VALUES
Day and Date: Saturday, 10-12-2016 Time: 10.00 a.m. to 12.00 noon	Max. Marks : 50
in Answer Book I 2) Answer MCQ/O I	Pulsory. It should be solved in first 20 minutes Page No. 3. Each question carries one mark. bjective type questions on Page No. 3 only. mention, Q.P. Set (P/Q/R/S) on Top of Page. indicate full marks.
MCQ/Objectiv	ve Type Questions
Duration : 20 Minutes	Marks: 10
1. Choose the correct answer:	
1) is not a moral duty.A) To vote the local governmentC) Not to pollute water	B) To keep surroundings cleanD) To pay taxes
2) Kohlberg theory is related toA) Moral DevelopmentC) Motivation	B) Human values D) Team working
3) H R meansA) Human ResourceC) Head Resource	B) Honorary Responsibility D) Human Resistance
4) An identity of specific goods and made among different trades is caA) CopyrightC) Patent	services permitting the differences to be alled as B) Trademark D) None of above
 Alignment to the goals and Adhere activities can be referred as 	ence to the ethical principles during the

B) Co-operation

D) Confidence

A) Commitment

C) Empathy



6)		is not t	he part of internal	com	nmunication.		
	A)	Internal newslet	tters				
	B)	Mailers					
	C)	Electronic mails	5				
	D)	Advertise and m	narket honoring va	lues	3		
7)	F۱	MEA is a tool of					
	A)	Financial analys	sis	B)	Risk analysis		
	C)	Equity analysis		D)	None of above		
8)	Pa	tent is given to					
	A)	A product or a p	process	B)	Art		
	C)	Service		D)	None of above		
9)	In	FMEA, F stands	for				
	A)	Fatigue	B) Force	C)	Free	D)	Failure
10)		is not the re	equirement for eng	gine	er as an advisoı	۲.	
	A)	Objectivity		B)	Study all aspec	cts	
	C)	Values		D)	Sympathy bias		



Seat	
No.	

T.E. (All Branches) (Part – I) Examination, 2016 SELF LEARNING (HSS): PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 10-12-2016 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Figures at right indicate full marks.

2) Solve any 4 questions out of Q.No. 2 to Q.No. 7.

2. Explain the meaning of professional ethics. Also explain objectives of studying the professional ethics and human values.3. Explain variety of moral issues.

4. What are the engineering ethics? Explain the approach and scope of the same. 10

5. Explain the risk benefits analysis.

6. Explain collective bargaining.

7. Differentiate between Kohlberg's Theory and Gilligan's Theory.

10

SLR-EP - 602

					_		_	-
Seat No.							Set	Q
SELF	· ·	(All Branches) (I (HSS) : PROFES		•	-		I VAL	_UES
-	nd Date : Saturo 10.00 a.m. to 1	day, 10-12-2016 2.00 noon				Max.	Mark	s : 50
	Instructions :	 Q. No. 1 is composite in Answer Book Answer MCQ/ODOn't forget to Figures at right 	R Page N Objective mention	lo. 3. Eacl e type quo n, Q.P. Se	h question e stions o i t (P/Q/R/S	carries c n Page N	one m o. 3 o	ark. nly.
		MCQ/Object	ive Type	Questio	ns			
Duratio	on : 20 Minutes						Mark	s:10
1. Ch	noose the corre	ect answer :						
1)	In FMEA, F st	tands for						
	A) Fatigue	B) Force	C)	Free	D)	Failure		
2))is not	the requirement fo	r engine	er as an a	dvisor.			
	A) Objectivity	<i>(</i>	B)	Study all	aspects			
	C) Values		D)	Sympath	y bias			
3)	FMEA is a too	ol of						
	A) Financial a	analysis	B)	Risk ana	lysis			
	C) Equity and	alysis	D)	None of a	above			
4)	Patent is give	n to						
	A) A product	or a process	B)	Art				
	C) Service		D)	None of a	above			
5))is r	not a moral duty.						

A) To vote the local government

C) Not to pollute water

C) Motivation

6) Kohlberg theory is related toA) Moral Development

B) To keep surroundings clean

D) To pay taxes

B) Human values

D) Team working

SLR-EP-602

-2-



7)	HR means	
	A) Human Resource	B) Honorary Responsibility
	C) Head Resource	D) Human Resistance
8)	An identity of specific goods and ser made among different trades is called	vices permitting the differences to be
	A) Copyright	B) Trademark
	C) Patent	D) None of above
9)	Alignment to the goals and Adherence activities can be referred as	e to the ethical principles during the
	A) Commitment	B) Co-operation
	C) Empathy	D) Confidence
10)	is not the part of internal of	communication.
	A) Internal newsletters	
	B) Mailers	
	C) Electronic mails	
	D) Advertise and market honoring val	ues



Seat	
No.	

T.E. (All Branches) (Part – I) Examination, 2016 SELF LEARNING (HSS): PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 10-12-2016 Marks: 40

Time: 10.00 a.m. to 12.00 noon

6. Explain collective bargaining.

Instructions: 1) Figures at **right** indicate **full** marks.

2) Solve any 4 questions out of Q.No. 2 to Q.No. 7.

Explain the meaning of professional ethics. Also explain objectives of studying the professional ethics and human values.
 Explain variety of moral issues.
 What are the engineering ethics? Explain the approach and scope of the same.
 Explain the risk benefits analysis.

7. Differentiate between Kohlberg's Theory and Gilligan's Theory.

10

			SLR-E	P-602
Seat No.				Set R
T.E. (A SELF LEARNING (H	All Branches) (P HSS) : PROFES	•	•	N VALUES
Day and Date: Saturda Time: 10.00 a.m. to 12	•		Max	. Marks : 50
2	2) Answer MCQ/O	Page No. 3. Each bjective type ques mention, Q.P. Set	question carries o stions on Page N (P/Q/R/S) on Top	one mark. lo. 3 only.
Duration : 20 Minutes	MCQ/Objecti	ve Type Question	S	Marks: 10
Choose the correct	t answer :			
activities can b		B) Co-operati	ion) the
C) Empathy 2) is	not the part of inter	D) Confidence		
A) Internal nevB) MailersC) Electronic r			1.	
 In FMEA, F sta A) Fatigue 	nds for B) Force	C) Free	D) Failure	

B) Study all aspects A) Objectivity

C) Values D) Sympathy bias

5) HR means

A) Human Resource B) Honorary Responsibility

C) Head Resource D) Human Resistance



6)	An identity of specific goods and semade among different trades is called	vices permitting the differences to be das
	A) Copyright	B) Trademark
	C) Patent	D) None of above
7)	is not a moral duty.	
	A) To vote the local government	B) To keep surroundings clean
	C) Not to pollute water	D) To pay taxes
8)	Kohlberg theory is related to	
	A) Moral Development	B) Human values
	C) Motivation	D) Team working
9)	FMEA is a tool of	
·	A) Financial analysis	B) Risk analysis
	C) Equity analysis	D) None of above
10)	Patent is given to	
	A) A product or a process	B) Art
	C) Service	D) None of above



Seat	
No.	

T.E. (All Branches) (Part – I) Examination, 2016 SELF LEARNING (HSS): PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 10-12-2016 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Figures at right indicate full marks.

7. Differentiate between Kohlberg's Theory and Gilligan's Theory.

2) Solve any 4 questions out of Q.No. 2 to Q.No. 7.

Explain the meaning of professional ethics. Also explain objectives of studying the professional ethics and human values.
 Explain variety of moral issues.
 What are the engineering ethics? Explain the approach and scope of the same.
 Explain the risk benefits analysis.
 Explain collective bargaining.

SLR-EP - 602

Seat No.	Set	S
----------	-----	---

T.E. (All Branches) (Part – I) Examination, 2016 SELF LEARNING (HSS): PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

C) Electronic mails

D) Advertise and market honoring values

Instructions: 1) Q. No. 1 is compulsory. It should be solved in first 20 minutes in Answer Book Page No. 3. Each question carries one mark.

- 2) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.
- 3) Figures at **right** indicate **full** marks.

MCQ/Objective Type Questions

Duratio	on : 20 Minutes		Marks: 10
1. Ch	oose the correct answer :		
1)	H R means		
	A) Human Resource	B) Honorary Responsibility	
	C) Head Resource	D) Human Resistance	
2)	An identity of specific goods and semande among different trades is called	•	s to be
	A) Copyright	B) Trademark	
	C) Patent	D) None of above	
3)	Alignment to the goals and Adherence activities can be referred as	e to the ethical principles during) the
	A) Commitment	B) Co-operation	
	C) Empathy	D) Confidence	
4)	is not the part of internal	communication.	
	A) Internal newsletters		
	B) Mailers		



5)	FMEA is a tool of					
	A) Financial analys	sis	B)	Risk analysis		
	C) Equity analysis		D)	None of above		
6)	Patent is given to					
	A) A product or a p	orocess	B)	Art		
	C) Service		D)	None of above		
7)	In FMEA, F stands	for				
	A) Fatigue	B) Force	C)	Free	D)	Failure
8)	is not the r	equirement for eng	gine	er as an advisor	.	
	A) Objectivity		B)	Study all aspec	cts	
	C) Values		D)	Sympathy bias		
9)	is not a	moral duty.				
	A) To vote the loca	al government	B)	To keep surrou	ndir	ngs clean
	C) Not to pollute w	ater	D)	To pay taxes		
10)	Kohlberg theory is	related to				
	A) Moral Developm	nent	B)	Human values		
	C) Motivation		D)	Team working		



Seat	
No.	

T.E. (All Branches) (Part – I) Examination, 2016 SELF LEARNING (HSS): PROFESSIONAL ETHICS AND HUMAN VALUES

Day and Date: Saturday, 10-12-2016 Marks: 40

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Figures at right indicate full marks.

2) Solve any 4 questions out of Q.No. 2 to Q.No. 7.

2. Explain the meaning of professional ethics. Also explain objectives of studying the professional ethics and human values.3. Explain variety of moral issues.

4. What are the engineering ethics? Explain the approach and scope of the same. 10

5. Explain the risk benefits analysis.

6. Explain collective bargaining.

7. Differentiate between Kohlberg's Theory and Gilligan's Theory.

10

SLR-EP - 603

Marks: 10

Seat		
No.	Set	P

T.E. (Part – I) (All Branches) Examination, 2016 ECONOMICS (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7.

- 2) All questions carry equal marks.
- 3) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

1. Choose the correct answers: 10 1) Economics is a _____science. a) Positive b) Normative d) None of the above c) Both (a) and (b) 2) Product differentiation is a characteristics of _____ market. a) Perfect competition b) Monopoly c) Monopolistic competition d) Price competition 3) _____ is the subject matter of micro economics. a) National Income b) Fiscal Policy d) Theory of Consumer's Choice c) Monetary Policy 4) Gross National Income – Depreciation = ? a) Net National Income b) Disposable Income c) Net Domestic Income d) Personal Income 5) Supply of money is a) A stock concept b) A flow concept c) Both stock and flow concept d) Neither a stock nor a flow concept

SLR-EP - 603

-2-



6)	A firm in a perfectly competitive market faces				
	a) A perfectly elastic demand function				
	b) A perfectly inelastic demand fu	unction			
	c) A demand function with unitar	y elasticity			
	d) None of the above				
7)	The most important determinant of	of consumer spending is			
	a) The level of household debt	b) Consumer expectations			
	c) The stock of wealth	d) The level of income			
8)	Investment and saving are, respe	ctively			
	a) Income and wealth	b) Stocks and flows			
	c) Injections and leakages	d) Leakages and injections			
9)	Which of the following is NOT an	account in the Balance of Payments?			
	a) Current Account	b) Capital Account			
	c) Financial Account	d) Future Account			
10)	Automatic correction in balance of	f payment is the main advantage			
	a) Fixed exchange rate system				
	b) Flexible exchange rate system	า			
	c) Peg exchange rate system				
	d) None of the above				



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 ECONOMICS (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Marks: 40 Time: 10.00 a.m. to 12.00 noon Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7. 2) All questions carry equal marks. 2. Write short notes: 10 1) Functions of Central Banking 2) Fiscal Policy. 3. Write short notes: 10 1) Exchange Rate 2) Monopoly. 4. What is meant by economic policy? Discuss features of new economic policy in India. 10 10 5. Define perfect competition, explain the features of perfect competition. 6. What is balance of payment disequilibrium? Discuss measures to correct disequilibrium in balance of payment. 10 10 7. What is inflation? Discuss fiscal and monetary measure to control inflation.

Seat		
No.	Set	Q

T.E. (Part – I) (All Branches) Examination, 2016 ECONOMICS (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7.

- 2) All questions carry equal marks.
- 3) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

1.	Choose the correct answers :	
	1) The most important determinant	of consumer spending is
	a) The level of household debt	b) Consumer expectations
	c) The stock of wealth	d) The level of income
	2) Investment and saving are, respe	ectively
	a) Income and wealth	b) Stocks and flows
	c) Injections and leakages	d) Leakages and injections
	3) Which of the following is NOT ar	n account in the Balance of Payments?
	a) Current Account	b) Capital Account
	c) Financial Account	d) Future Account
	4) Automatic correction in balance of	of payment is the main advantage
	a) Fixed exchange rate system	
	b) Flexible exchange rate system	m
	c) Peg exchange rate system	
	d) None of the above	

Marks: 10



5)	Economics is a	science.	
	a) Positive	b) Normative	
	c) Both (a) and (b)	d) None of the above	Э
6)	Product differentiation is a cl	naracteristics of	market.
	a) Perfect competition	b) Monopoly	
	c) Monopolistic competition	d) Price competition	
7)	is the subject n	natter of micro economics.	
	a) National Income	b) Fiscal Policy	
	c) Monetary Policy	d) Theory of Consur	ner's Choice
8)	Gross National Income – De	preciation = ?	
	a) Net National Income	b) Disposable Incom	ne
	c) Net Domestic Income	d) Personal Income	
9)	Supply of money is		
	a) A stock concept	b) A flow concept	
	c) Both stock and flow cond	ept d) Neither a stock n	or a flow concept
10)	A firm in a perfectly competi	tive market faces	
	a) A perfectly elastic demar	nd function	
	b) A perfectly inelastic dema	and function	
	c) A demand function with u	ınitary elasticity	
	d) None of the above		



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 ECONOMICS (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Marks: 40 Time: 10.00 a.m. to 12.00 noon Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7. 2) All questions carry equal marks. 2. Write short notes: 10 1) Functions of Central Banking 2) Fiscal Policy. 3. Write short notes: 10 1) Exchange Rate 2) Monopoly. 4. What is meant by economic policy? Discuss features of new economic policy in India. 10 10 5. Define perfect competition, explain the features of perfect competition. 6. What is balance of payment disequilibrium? Discuss measures to correct disequilibrium in balance of payment. 10 10 7. What is inflation? Discuss fiscal and monetary measure to control inflation.

Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 **ECONOMICS** (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7.

- 2) All questions carry equal marks.
- 3) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

10

- 1) Supply of money is
 - a) A stock concept
- b) A flow concept
- c) Both stock and flow concept d) Neither a stock nor a flow concept
- 2) A firm in a perfectly competitive market faces
 - a) A perfectly elastic demand function
 - b) A perfectly inelastic demand function
 - c) A demand function with unitary elasticity
 - d) None of the above
- 3) Which of the following is NOT an account in the Balance of Payments?
 - a) Current Account

b) Capital Account

c) Financial Account

- d) Future Account
- 4) Automatic correction in balance of payment is the main advantage

- a) Fixed exchange rate system
- b) Flexible exchange rate system
- c) Peg exchange rate system
- d) None of the above



၁)	is the subject matter	of micro economics.
	a) National Income	b) Fiscal Policy
	c) Monetary Policy	d) Theory of Consumer's Choice
6)	Gross National Income – Depreci	ation = ?
	a) Net National Income	b) Disposable Income
	c) Net Domestic Income	d) Personal Income
7)	Economics is ascien	nce.
	a) Positive	b) Normative
	c) Both (a) and (b)	d) None of the above
8)	Product differentiation is a charac	teristics of market.
	a) Perfect competition	b) Monopoly
	c) Monopolistic competition	d) Price competition
9)	The most important determinant o	f consumer spending is
	a) The level of household debt	b) Consumer expectations
	c) The stock of wealth	d) The level of income
10)	Investment and saving are, respec	ctively
	a) Income and wealth	b) Stocks and flows
	c) Injections and leakages	d) Leakages and injections



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 ECONOMICS (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Marks: 40 Time: 10.00 a.m. to 12.00 noon Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7. 2) All questions carry equal marks. 2. Write short notes: 10 1) Functions of Central Banking 2) Fiscal Policy. 3. Write short notes: 10 1) Exchange Rate 2) Monopoly. 4. What is meant by economic policy? Discuss features of new economic policy in India. 10 10 5. Define perfect competition, explain the features of perfect competition. 6. What is balance of payment disequilibrium? Discuss measures to correct disequilibrium in balance of payment. 10 10 7. What is inflation? Discuss fiscal and monetary measure to control inflation.

SLR-EP - 603

Seat	
No.	

Set

OCI

T.E. (Part – I) (All Branches) Examination, 2016 ECONOMICS (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Total Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7.

- 2) All questions carry equal marks.
- 3) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10 1. Choose the correct answers: 10 1) _____ is the subject matter of micro economics. b) Fiscal Policy a) National Income d) Theory of Consumer's Choice c) Monetary Policy 2) Gross National Income – Depreciation = ? a) Net National Income b) Disposable Income c) Net Domestic Income d) Personal Income 3) Supply of money is a) A stock concept b) A flow concept c) Both stock and flow concept d) Neither a stock nor a flow concept 4) A firm in a perfectly competitive market faces a) A perfectly elastic demand function b) A perfectly inelastic demand function c) A demand function with unitary elasticity d) None of the above

-2-



5)	i ne most important determinant d	of consumer spending is	
	a) The level of household debt	b) Consumer expectations	S
	c) The stock of wealth	d) The level of income	
6)	Investment and saving are, respe	ctively	
	a) Income and wealth	b) Stocks and flows	
	c) Injections and leakages	d) Leakages and injection	S
7)	Which of the following is NOT an	account in the Balance of F	ayments 1
	a) Current Account	b) Capital Account	
	c) Financial Account	d) Future Account	
8)	Automatic correction in balance of	of payment is the main adva	ntage
	a) Fixed exchange rate system		
	b) Flexible exchange rate system	n	
	c) Peg exchange rate system		
	d) None of the above		
9)	Economics is ascien	nce.	
	a) Positive	b) Normative	
	c) Both (a) and (b)	d) None of the above	
10)	Product differentiation is a characteristic	cteristics of ma	arket.
	a) Perfect competition	b) Monopoly	
	c) Monopolistic competition	d) Price competition	



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 ECONOMICS (Self Learning – H.S.S.)

Day and Date: Saturday, 10-12-2016 Marks: 40 Time: 10.00 a.m. to 12.00 noon Instructions: 1) Attempt any 4 out of Q. 2 to Q. 7. 2) All questions carry equal marks. 2. Write short notes: 10 1) Functions of Central Banking 2) Fiscal Policy. 3. Write short notes: 10 1) Exchange Rate 2) Monopoly. 4. What is meant by economic policy? Discuss features of new economic policy in India. 10 10 5. Define perfect competition, explain the features of perfect competition. 6. What is balance of payment disequilibrium? Discuss measures to correct disequilibrium in balance of payment. 10 10 7. What is inflation? Discuss fiscal and monetary measure to control inflation.



No. Set P

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: i) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.

ii) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

				Marks : 1	0
1. A) Choo	ose the correct ans	wers:		5
	a b	here area) Individual and orgo b) Personal and inte c) occupational and d) Inter personal an	ganisational erpersonal I job level	_ strategies to cope with stress.	
	·	is the contribution is the contribution is the contribution in the contribution is the contribution in the contribution in the contribution is the contribution in the contribution in the contribution is the contribution in the contribution in the contribution is the contribution in the contribution in the contribution is the contribution in the	b)	e expectation of the role one occupies. Role Isolation Role ambiguity	
	·	tress is a) Positively b) Proportionately	b)	mance. Negatively None of these	
	а	ack of cohensivene a) Individual level c) Group level	b)	stressor. Organisational level Extra organisational level	
	st	bsenteeism, turnov tress. a) Medical b) Behavioural	b)	uctivity are symptoms of Psychological None of these	

5

B) Match the pairs:

Set "A"

- 1) Psychological systems
- 2) Physiological symptoms
- 3) Individual factors
- 4) Organisational factors
- 5) Environmental factors

Set "B"

- 1) Organisational stressors
- 2) Political uncertainty
- 3) High blood pressure
- 4) Family problems
- 5) Anxiety

Set P



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016
Time: 10.00 a.m. to 12.00 noon

Instruction: Solve any 4 from Q. No. 2 to Q. No. 7.

2. Define stress and explain current and historical status of stress.

3. Explain common sources of stress in detail.

4. Elaborate the various consequences of stress.

5. Explain the various stress management techniques.

6. Discuss the nature of stress response.

Marks: 40

Marks: 40

Marks: 40

10

7. What does the role of social support play in mitigating stress?

10



1.

SLR-EP - 604

No. Set Q

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: i) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.

ii) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

			Marks: 10
A) Choose the correct ans	wers:		5
1) Lack of cohensivene	ess is	stressor.	
a) Individual level	b)	Organisational level	
c) Group level	d)	Extra organisational	level
Absenteeism, turnov stress.	ver and less produ	ıctivity are	symptoms of
a) Medical	b)	Psychological	
c) Behavioural	d)	None of these	
 3) There are	ganisational erpersonal d job level	strategies to cope wit	h stress.
4) is the co	nfusion about the	expectation of the role	e one occupies.
a) Role stagnation	b)	Role Isolation	
c) Role erosion	d)	Role ambiguity	
5) Stress is	related to perform	nance.	
a) Positively	b)	Negatively	
c) Proportionately	d)	None of these	



5

B) Match the pairs:

Set "A"

- 1) Psychological systems
- 2) Physiological symptoms
- 3) Individual factors
- 4) Organisational factors
- 5) Environmental factors

Set "B"

- 1) Organisational stressors
- 2) Political uncertainty
- 3) High blood pressure
- 4) Family problems
- 5) Anxiety

Set Q



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016
Time: 10.00 a.m. to 12.00 noon

Instruction: Solve any 4 from Q. No. 2 to Q. No. 7.

2. Define stress and explain current and historical status of stress.

3. Explain common sources of stress in detail.

4. Elaborate the various consequences of stress.

10

5. Explain the various stress management techniques.

10

10

10

7. What does the role of social support play in mitigating stress?

10



1.

SLR-EP - 604

Marks: 10

	Seat No.		Set	R
--	-------------	--	-----	---

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: i) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.

ii) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

A)	Ch	oose the correct answers :		5	,
	1)	Stress is related to perface a) Positively c) Proportionately	mance.) Negatively) None of these		
	2)	Lack of cohensiveness is a) Individual level c) Group level	stressor. Organisational level Extra organisational leve	el	
	3)	Absenteeism, turnover and less prostress. a) Medical c) Behavioural	uctivity are syl) Psychological) None of these	mptoms of	
	4)	There are and and a) Individual and organisational b) Personal and interpersonal c) occupational and job level d) Inter personal and intrapersonal	_ strategies to cope with st	ress.	
	5)	a) Role stagnationc) Role erosion	e expectation of the role or Role Isolation Role ambiguity	e occupies.	



5

B) Match the pairs:

Set "A"

- 1) Psychological systems
- 2) Physiological symptoms
- 3) Individual factors
- 4) Organisational factors
- 5) Environmental factors

Set "B"

- 1) Organisational stressors
- 2) Political uncertainty
- 3) High blood pressure
- 4) Family problems
- 5) Anxiety

Set R



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016 Marks: 40 Time: 10.00 a.m. to 12.00 noon Instruction: Solve any 4 from Q. No. 2 to Q. No. 7. 2. Define stress and explain current and historical status of stress. 10 3. Explain common sources of stress in detail. 10 4. Elaborate the various consequences of stress. 10 5. Explain the various stress management techniques. 10 10 6. Discuss the nature of stress response. 7. What does the role of social support play in mitigating stress? 10



Marks: 10

No. Set S

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

Instructions: i) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.

ii) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

1. A) Ch	oose the correct answ	ers:		
1)	a) Role stagnation	1	ne expectation of the role b) Role Isolation	e one occupies.
2)	c) Role erosion Stress isr		d) Role ambiguity	
۷)	a) Positively c) Proportionately		b) Negatively d) None of these	
3)	Lack of cohensivenes a) Individual level c) Group level	1	_ stressor. b) Organisational level d) Extra organisational	level
-	Absenteeism, turnove stress.	er and less pro	ductivity are	symptoms of
	a) Medicalc) Behavioural		b) Psychological d) None of these	
5)	There area) Individual and orgab) Personal and interc) occupational and jd) Inter personal and	anisational personal job level	strategies to cope wit	h stress.

5

B) Match the pairs:

Set "A"

- 1) Psychological systems
- 2) Physiological symptoms
- 3) Individual factors
- 4) Organisational factors
- 5) Environmental factors

Set "B"

- 1) Organisational stressors
- 2) Political uncertainty
- 3) High blood pressure
- 4) Family problems
- 5) Anxiety

Set S



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 SELF LEARNING (HSS) Stress And Coping

Day and Date: Saturday, 10-12-2016
Time: 10.00 a.m. to 12.00 noon

Instruction: Solve any 4 from Q. No. 2 to Q. No. 7.

2. Define stress and explain current and historical status of stress.

3. Explain common sources of stress in detail.

4. Elaborate the various consequences of stress.

5. Explain the various stress management techniques.

6. Discuss the nature of stress response.

Marks: 40

Marks: 40

10

7. What does the role of social support play in mitigating stress?

10

Seat		
No.	Set	P
		1 - 1

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

1. Choose the correct answers:

 $(10 \times 1 = 10)$

- 1) To apply for a patent, an inventor must
 - a) File an application at a patent office which must comply with formal and technical requirements
 - b) Draft the full specification of the patent they seek, which cannot be later amended
 - c) Demonstrate that their invention works
 - d) None of above
- 2) All of the following are examples of intellectual property protections except
 - a) Copyrights

b) Patents

c) Contracts

- d) Trademarks
- 3) A person develops a new process for making butter from milk having low fats and cholesterol. He wishes to protect it. Which form of IPR would be suitable?
 - a) Patent

b) Copyright

c) Trademarks

- d) Industrial Design
- 4) What is the term of a patent?
 - a) 35 years

b) 25 years

c) 20 years

d) 15 years

5)	No patent shall be	•			_	
	a) Atomic Energy	b) Bio Energy	c)	Solar Energy	d)	Wind Energy
6)	The first Patent Lav	w was enacted in I	ndi	a in the year		
	a) 1856	b) 1880	c)	1905	d)	1850
7)	Which of the follow legislation?	ving is not specific	ally	protected by i	ntell	ectual property
	a) Industrial Desig	ns	b)	Trademarks		
	c) Copyrights		d)	Trade secrets		
8)	Intellectual Propert	y Rights are result	of			
,	a) Mental Work			Physical Work		
	c) Technical Work		d)	Communication	1	
9)	The legislation cov	ering intellectual	pro	perty right in In	ıdia	for Information
,	Technology is	G	•	. , ,		
	a) Information Tec	hnology Act 2003				
	b) Information Tec	hnology Act 2000				
	c) Information Tec	hnology Act 2003				
	d) Information Tec	hnology Act 2008				
10)	What is copyright n	neant for ?				
-	a) Film Work		b)	Books		
	c) Essay		d)	All the above		



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Saturday, 10-12-2016 Marks : 40 Time : 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

2) Figures to the **right** indicate **full** marks.

2. Explain in detail Indian Patent Act, 1970.

3. Elaborate the copyright issues in creative works.

OR

Explain process patent registration.

4. Write short notes on any four:

1) Copyrights.

2) Trade secrets.

3) Biotechnology and intellectual property.

4) Publication and examination of patent applications.

5) Protection of traditional knowledge.

6) Essential requirements for granting patent.

Seat		
No.	Set	(Q)

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

1. Choose the correct answers:

 $(10 \times 1 = 10)$

- 1) The legislation covering intellectual property right in India for Information Technology is
 - a) Information Technology Act 2003
 - b) Information Technology Act 2000
 - c) Information Technology Act 2003
 - d) Information Technology Act 2008
- 2) What is copyright meant for ?
 - a) Film Work

b) Books

c) Essay

- d) All the above
- 3) Which of the following is not specifically protected by intellectual property legislation?
 - a) Industrial Designs

b) Trademarks

c) Copyrights

d) Trade secrets

- 4) Intellectual Property Rights are result of
 - a) Mental Work

b) Physical Work

c) Technical Work

d) Communication



- 5) To apply for a patent, an inventor must
 - a) File an application at a patent office which must comply with formal and technical requirements
 - b) Draft the full specification of the patent they seek, which cannot be later amended
 - c) Demonstrate that their invention works
 - d) None of above
- 6) All of the following are examples of intellectual property protections except
 - a) Copyrights

b) Patents

c) Contracts

- d) Trademarks
- 7) A person develops a new process for making butter from milk having low fats and cholesterol. He wishes to protect it. Which form of IPR would be suitable?
 - a) Patent

b) Copyright

c) Trademarks

- d) Industrial Design
- 8) What is the term of a patent?
 - a) 35 years

b) 25 years

c) 20 years

- d) 15 years
- 9) No patent shall be granted in respect of an invention relating to
 - a) Atomic Energy b) Bio Energy
- c) Solar Energy
- d) Wind Energy
- 10) The first Patent Law was enacted in India in the year
 - a) 1856
- b) 1880
- c) 1905
- d) 1850



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Marks: 40 Day and Date: Saturday, 10-12-2016 Time: 10.00 a.m. to 12.00 noon **N.B.**: 1) Attempt all questions. 2) Figures to the right indicate full marks. 2. Explain in detail Indian Patent Act, 1970. 10 3. Elaborate the copyright issues in creative works. 10 OR Explain process patent registration. 10 4. Write short notes on any four: 20 1) Copyrights. 2) Trade secrets. 3) Biotechnology and intellectual property. 4) Publication and examination of patent applications. 5) Protection of traditional knowledge.

6) Essential requirements for granting patent.

Seat		
No.	Set	$ \mathbf{R} $

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date : Saturday, 10-12-2016	Max. Marks: 50
-------------------------------------	----------------

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is **compulsory**. It should be solved in Answer Book Page No. 3. **Each** question carries **one** mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

4	\sim 11		
7	Choose th	A CORRACT	aneware
	CHOOSE III	ヒ いいししい	allowelo

 $(10 \times 1 = 10)$

- 1) No patent shall be granted in respect of an invention relating to
 - a) Atomic Energy b) Bio Energy
- c) Solar Energy
- d) Wind Energy
- 2) The first Patent Law was enacted in India in the year
 - a) 1856
- b) 1880
- c) 1905
- d) 1850
- 3) The legislation covering intellectual property right in India for Information Technology is
 - a) Information Technology Act 2003
 - b) Information Technology Act 2000
 - c) Information Technology Act 2003
 - d) Information Technology Act 2008
- 4) What is copyright meant for ?
 - a) Film Work

b) Books

c) Essay

- d) All the above
- 5) A person develops a new process for making butter from milk having low fats and cholesterol. He wishes to protect it. Which form of IPR would be suitable?
 - a) Patent

b) Copyright

c) Trademarks

d) Industrial Design

6)	What is the term of a patent?		
	a) 35 years	b)	25 years
	c) 20 years	ď)	15 years
7) To apply for a patent, an inventor must			
	 a) File an application at a patent office technical requirements 	e v	which must comply with formal and
	b) Draft the full specification of the paramended	ater	nt they seek, which cannot be later
	c) Demonstrate that their invention wd) None of above	ork	S
8)	All of the following are examples of int	telle	ectual property protections except
	a) Copyrights	b)	Patents
	c) Contracts	d)	Trademarks
9)	Which of the following is not specific	ally	protected by intellectual property
	legislation?		
	a) Industrial Designs	b)	Trademarks
	c) Copyrights	d)	Trade secrets
10)	Intellectual Property Rights are result	of	
	a) Mental Work	b)	Physical Work
	c) Technical Work	d)	Communication



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Day and Date: Saturday, 10-12-2016

Time: 10.00 a.m. to 12.00 noon

**N.B.: 1) Attempt all questions.

2) Figures to the right indicate full marks.

2. Explain in detail Indian Patent Act, 1970.

10

3. Elaborate the copyright issues in creative works.

OR

Explain process patent registration.

10

4. Write short notes on any four:

20

- 1) Copyrights.
- 2) Trade secrets.
- 3) Biotechnology and intellectual property.
- 4) Publication and examination of patent applications.
- 5) Protection of traditional knowledge.
- 6) Essential requirements for granting patent.

Seat		
No.	Set	S
		1 —

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY **DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))**

Day and Date: Saturday, 10-12-2016 Max. Marks: 50

Time: 10.00 a.m. to 12.00 noon

N.B.: 1) Attempt all questions.

- 2) Figures to the **right** indicate **full** marks.
- 3) Q. No. 1 is compulsory. It should be solved in Answer Book Page No. 3. Each question carries one mark.
- 4) Answer MCQ/Objective type questions on Page No. 3 only. Don't forget to mention, Q.P. Set (P/Q/R/S) on Top of Page.

MCQ/Objective Type Questions

Marks: 10

 Choose the correct answer 	ers :
---	-------

 $(10 \times 1 = 10)$

- 1) A person develops a new process for making butter from milk having low fats and cholesterol. He wishes to protect it. Which form of IPR would be suitable? a) Patent

b) Copyright

c) Trademarks

- d) Industrial Design
- 2) What is the term of a patent?
 - a) 35 years

b) 25 years

c) 20 years

- d) 15 years
- 3) No patent shall be granted in respect of an invention relating to
 - a) Atomic Energy b) Bio Energy
- c) Solar Energy
- d) Wind Energy
- 4) The first Patent Law was enacted in India in the year
 - a) 1856
- b) 1880
- c) 1905
- d) 1850
- 5) Which of the following is not specifically protected by intellectual property legislation?
 - a) Industrial Designs

b) Trademarks

c) Copyrights

- d) Trade secrets
- 6) Intellectual Property Rights are result of
 - a) Mental Work

b) Physical Work

c) Technical Work

d) Communication



- 7) The legislation covering intellectual property right in India for Information Technology is
 - a) Information Technology Act 2003
 - b) Information Technology Act 2000
 - c) Information Technology Act 2003
 - d) Information Technology Act 2008
- 8) What is copyright meant for?
 - a) Film Work

b) Books

c) Essay

- d) All the above
- 9) To apply for a patent, an inventor must
 - a) File an application at a patent office which must comply with formal and technical requirements
 - b) Draft the full specification of the patent they seek, which cannot be later amended
 - c) Demonstrate that their invention works
 - d) None of above
- 10) All of the following are examples of intellectual property protections except
 - a) Copyrights

b) Patents

c) Contracts

d) Trademarks



Seat	
No.	

T.E. (Part – I) (All Branches) Examination, 2016 INTELLECTUAL PROPERTY RIGHTS FOR TECHNOLOGY DEVELOPMENT AND MANAGEMENT (Self Learning (HSS))

Marks: 40 Day and Date: Saturday, 10-12-2016 Time: 10.00 a.m. to 12.00 noon **N.B.**: 1) Attempt all questions. 2) Figures to the right indicate full marks. 2. Explain in detail Indian Patent Act, 1970. 10 3. Elaborate the copyright issues in creative works. 10 OR Explain process patent registration. 10 4. Write short notes on any four: 20 1) Copyrights. 2) Trade secrets. 3) Biotechnology and intellectual property. 4) Publication and examination of patent applications. 5) Protection of traditional knowledge. 6) Essential requirements for granting patent.