

Q.3 a) Bring out the process of communication by illuminating different constituents of communication. **10**

OR

b) Elaborate different channels of communication.

Q.4 Write a detailed note on the intrapersonal skills. **10**

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Paper - I)
Physical Chemistry (22221106)

Day & Date: Sunday, 12-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic tables and calculator is allowed.
 (At. Wts. H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5)

Q.1 Multiple choice questions.

08

- 1) Decomposition of nitrogen pentoxide is an example of _____ reaction.
 - a) unimolecular
 - b) pseudo unimolecular
 - c) bimolecular
 - d) termolecular
- 2) The slope of straight line _____.
 - a) always positive
 - b) always negative
 - c) may be positive or negative
 - d) zero
- 3) The rate constant $k = 2.303/t \cdot \log a/a-x$, this represents _____ order reaction.
 - a) third
 - b) second
 - c) zero
 - d) first
- 4) The unit for van der Waal's constant 'a' is _____.
 - a) $L \text{ mol}^{-1}$
 - b) $N \text{ m}^{-2}$
 - c) $N \text{ m}^4 \text{ mol}^{-2}$
 - d) m^3
- 5) All spontaneous processes are irreversible. This statement represents _____ law of thermodynamics.
 - a) zeroth
 - b) first
 - c) second
 - d) third
- 6) A real gas will approach the behavior of ideal gas at _____.
 - a) low temperature and low pressure
 - b) low temperature and high pressure
 - c) high temperature and low pressure
 - d) high temperature and high pressure
- 7) Sum of the exponent terms of the concentration terms in rate law of a chemical reaction is referred as _____.
 - a) order
 - b) molecularity
 - c) rate constant
 - d) velocity of a reaction
- 8) Excluded volume of a gas molecule is _____ the actual volume of a gas molecule.
 - a) twice
 - b) three times
 - c) four times
 - d) double

- Q.2 Answer any four of the following.** **08**
- a) For a straight line equation $y = mx - C$, sketch the nature of the graph.
 - b) Give the mechanism of the reaction between $K_2S_2O_8$ and KI .
 - c) Define efficiency of heat engine.
 - d) What do you mean by pseudo-unimolecular reaction? Give one example of this type.
 - e) State Joule-Thomson effect.
- Q.3 Write short notes on any two of the following.** **08**
- a) Rules of integration
 - b) Spontaneous and non spontaneous processes
 - c) Factors affecting rate of reaction
- Q.4 Answer any Two of the following.** **08**
- a) Calculate the critical constants P_c and of V_c of a given gas if van der Waals constants a and b are $5.4 \times 10^5 \text{ Nm}^2\text{lit}^2\text{mol}^{-2}$ and $0.04596 \text{ lit mol}^{-1}$ respectively.
 - b) A second order reaction, where initial concentrations of the reactants are same, is 40% completed in 480 secs. How long will it take for the reaction to go to 70% completion?
 - c) What is a slope? Explain the characteristics of slope.
- Q.5 Answer any one of the following** **08**
- a) What is an isotherm? Discuss Andrew's isotherm for carbon dioxide gas.
 - b) By using Carnot's cycle, derive the expression for efficiency of the process.

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper - I)
Fundamental of Computer (22221120)

Day & Date: Sunday, 12-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Choose Correct Alternatives.

08

- 1) _____ is the volatile memory of computer.
 - a) RAM
 - b) ROM
 - c) Both a and B
 - d) None of the above
- 2) Default extension of power point file is _____.
 - a) .txt
 - b) .pptx
 - c) .docx
 - d) all of these
- 3) To save a new text file _____ short cut key is used.
 - a) Ctrl + Z
 - b) Ctrl + 0
 - c) Ctrl + V
 - d) Ctrl + S
- 4) The bar at the bottom of a window that holds no. of applications is known as?
 - a) title bar
 - b) status bar
 - c) menu bar
 - d) task bar
- 5) Plotter is _____ type of device.
 - a) Input
 - b) Scanning
 - c) Pointing
 - d) Output
- 6) Computer is free from tire some We call it _____.
 - a) Accuracy
 - b) Reliability
 - c) Diligence
 - d) Versatility
- 7) 1Mb is equal to _____.
 - a) 1024 bytes
 - b) 1024 Kb
 - c) 1024 Mb
 - d) 1024 Tb
- 8) Which of the following is the smallest unit of storage?
 - a) GB
 - b) KB
 - c) MB
 - d) TB

Q.2 Answer any four of the following.

08

- a) What is computer?
- b) Define Application Software.
- c) Define hardware.
- d) List out all input devices.
- e) What is Mail-merge?
- f) Define output Device.

- Q.3 Write short notes on any two of the following.** **08**
- a) Mainframe computer
 - b) Primary memory
 - c) Algorithm
- Q.4 Answer any Two of the following.** **08**
- a) Write the features of MS-Word.
 - b) Explain different applications of computer.
 - c) Write any four excel functions with example.
- Q.5 Answer any One of the following** **08**
- a) Write the steps of mail merge.
 - b) Explain mouse and its types.

Seat No.	
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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Paper - II)
Inorganic Chemistry (22221107)

Day & Date: Wednesday, 10-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

Q.1 Choose the correct alternative from given option.

08

- 1) _____ bond are non-directional.
 - a) Coordinate
 - b) Co-ordinate covalent
 - c) Covalent
 - d) Ionic
- 2) The co-ordination number of ion in CsCl is _____.
 - a) 7
 - b) 6
 - c) 5
 - d) 4
- 3) On heating, PCl₅ molecule is converted into _____.
 - a) PCl₃
 - b) Cl
 - c) PCl₄
 - d) PCl₂
- 4) In H₂O molecule _____ hybridization is present.
 - a) sp
 - b) sp²
 - c) sp³
 - d) none of these
- 5) O₂ molecule contains _____ unpaired electrons.
 - a) one
 - b) two
 - c) three
 - d) four
- 6) N-N bond length in N₂ molecule is, _____ Å.
 - a) 1.09
 - b) 1.12
 - c) 1.13
 - d) 1.18
- 7) Azimuthal quantum number has the values _____.
 - a) 0
 - b) 2n
 - c) from 0 to n-1
 - d) 2n²
- 8) Protons are _____ charged particle.
 - a) positively
 - b) negatively
 - c) neutral
 - d) all the above

Q.2 Answer any four of the following.

08

- a) Give conditions of successful overlap of atomic orbital.
- b) What is non bonding molecular orbital?
- c) Draw Mo diagram of Li₂ molecule.
- d) Draw orbital diagram of BF₃.
- e) Define :
 - 1) Unit cell
 - 2) Ionic bond
- f) Define quantum number.

- Q.3 Write short notes on any two of the following.** **08**
- a) Shapes of p orbitals.
 - b) What is radius ratio? Calculate radius ratio for octahedral geometry.
 - c) Valence bond theory
- Q.4 Answer any two of the following.** **08**
- a) Pauli's exclusion principle
 - b) Explain the formation of SiCl_4 molecule
 - c) Distinguish between bonding and anti-bonding molecular orbital.
- Q.5 Answer any one of the following.** **08**
- a) Explain in brief sp hybridization with example.
 - b) Discuss Born-Haber cycle for NaCl.

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper - II)
Programming Using C (22221121)

Day & Date: Wednesday, 10-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions.

08

- 1) _____ is the multi-way decision making statement.
 - a) goto
 - b) switch
 - c) if
 - d) for
- 2) _____ operator returns the number of bytes that the operand occupies.
 - a) sizeof
 - b) bitwise
 - c) byte
 - d) address
- 3) The range of char data type varies from _____ to _____.
 - a) -128 to 127
 - b) -32768 to 32767
 - c) 3.4e-38 to 3.4e+38
 - d) None of these
- 4) _____ function is essential to compile and execute 'C' program.
 - a) clrscr()
 - b) printf()
 - c) main()
 - d) getch()
- 5) Which of the following statement is/are correct?
 - I) int a = 55;
 - II) char b = 65;
 - a) Only I is correct
 - b) Only II is correct
 - c) Both are correct
 - d) Both are wrong
- 6) _____ operator not operates on floating type data.
 - a) sizeof
 - b) &&
 - c) %
 - d) ++
- 7) _____ format code is used to read array of character.
 - a) %char
 - b) %string
 - c) %s
 - d) %arr
- 8) _____ file is created after compilation of "Good.c" program.
 - a) Good.doc
 - b) Good.obj
 - c) Good.exe
 - d) Good.apk

Q.2 Answer any four of the following.

08

- a) Define Structure.
- b) How to declare union?
- c) Use of Sizeof operator
- d) Need of array
- e) What is string?
- f) What are the use of break statement?

- Q.3 Write short notes on any two of the following.** **08**
- a) Table of string
 - b) Storage Classes
 - c) Nested Structure
- Q.4 Answer any two of the following.** **08**
- a) Write a program to check give number is prime or not using function.
 - b) How to pass structure to function? Explain with example.
 - c) What is self-referential structure? Explain with example.
- Q.5 Answer any one of the following.** **08**
- a) What is command line argument? Explain with example.
 - b) Write a program to read & write data from or into text file.

Seat No.	
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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
PHYSICS (Paper - I)
Mechanics and Properties of Matter (22221104)

Day & Date: Friday, 12-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat & well labelled diagram wherever necessary.
 4) Use of logarithm tables and calculator is allowed.

Q.1 Multiple Choice Questions.

08

- 1) Venturimeter works on the basis of _____.
 a) Hooke's law
 b) Bernoulli's principle
 c) Poiseuille's equation
 d) Surface tension
- 2) When the liquid surface is curved the pressure on the convex side is _____ than that on the concave side.
 a) little more
 b) two times
 c) extremely large
 d) less
- 3) The time period of compound pendulum is minimum when _____.
 a) $l = 2k$
 b) $l = k$
 c) $l = 0$
 d) $l = k^2$
- 4) Moment of inertia is a _____ quantity.
 a) scalar
 b) vector
 c) dimensionless
 d) negative
- 5) Resistance of an elastic solid to elongation can be understood from its value of _____.
 a) mass
 b) elastic limit
 c) Young's modulus
 d) bulk modulus
- 6) Torsion pendulum can be used to determine _____ of the material of a wire.
 a) Young's modulus
 b) bulk modulus
 c) modulus of rigidity
 d) nature
- 7) If the velocity of the liquid layer changes by 50 cm/s at a distance of 25 cm from the fixed layer then the velocity gradient is _____.
 a) 0.5 s^{-1}
 b) 2 s^{-1}
 c) 1.25 s^{-1}
 d) 5 s^{-1}
- 8) Moment of inertia of a circular disc about its diameter is _____ times its moment of inertia about an axis passing through its centre and perpendicular to its plane.
 a) $1/2$
 b) $1/3$
 c) $1/4$
 d) 2

- Q.2 Answer any four of the following.** **08**
- a) Define Poisson's ratio and give its limiting values.
 - b) What do mean by streamline flow and turbulent flow of liquid?
 - c) Define surface tension and angle of contact.
 - d) State Hooke's law and define coefficient of elasticity.
 - e) Calculate the excess of inside a soap bubble of radius 0.1 mm if the surface tension of the soap solution is 0.05 N/m.
- Q.3 Answer any two of the following.** **08**
- a) Obtain an expression for M.I. of a fly Wheel.
 - b) Obtain the relation between surface tension, excess pressure and radius of Curvature.
 - c) When a load applied to the lower end of the rubber tube of inner radius 2.5 cm, there is an increase in length of 1.4 cm and change in the volume of 2.1 cc. Calculate the Poisson's ratio of the rubber.
- Q.4 Answer any two of the following.** **08**
- a) Show that shear strain is equivalent to compression and extension strains.
 - b) Describe Jaeger's method to determine surface tension of a liquid.
 - c) Moment of inertia of a rectangular lamina about an axis passing through its centre and parallel to breadth is $2.5 \times 10^3 \text{ gm. cm}^2$.
Calculate
 - i) Mass of the lamina
 - ii) M.I. about the breadth of lamina. (length of the lamina = 10 cm)
- Q.5 Answer any one of the following.** **08**
- a) Obtain Poiseuille's equation to determine the coefficient of viscosity of liquid.
 - b) From the theory of bifilar pendulum, obtain an expression for its time period.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper - I)**

Introduction to Microbiology and Microbial Diversity (22221114)

Day & Date: Friday, 12-04-2024

Max. Marks: 40

Time: 03:00 PM To 05:00 PM

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations whenever necessary.
4) Use of a logarithmic table and calculator is allowed.

Q.1 Choose the correct alternatives from the options.

08

- 1) The cells were first discovered by which of the following scientists?
 - a) Robert Hook
 - b) Robert Brown
 - c) Sir Alexander Fleming
 - d) None of the above
- 2) Who is known as the father of microbiology?
 - a) Louis Pasteur
 - b) Robert Koch
 - c) Antony Van Leeuwenhoek
 - d) Robert Hook
- 3) Which of the following scientists experimented with a specially designed box to prove dust carried the germs?
 - a) H. Schroder and T. Von Dusch
 - b) John Tyndall
 - c) Lazaro Spallanzani
 - d) Louis Pasteur
- 4) A virus is made up of _____.
 - a) Protein coat and nucleic acid
 - b) Protein coat and mitochondria
 - c) Nucleic acid and cell membrane
 - d) Nucleic acid, cell wall, and cell membrane
- 5) Which of the following statements are true about a virion?
 - a) Lytic phage
 - b) Lysogenic phage
 - c) The viral capsid
 - d) An infectious and fully formed viral particle
- 6) NCCS stands for _____.
 - a) National Centre for Cell Science
 - b) National Cadet for Cell Science
 - c) Nutritional Centre for Cell Science
 - d) None of the above
- 7) What is the approximate size of the bacterial cell?
 - a) 1 mm in diameter
 - b) 0.5 to 1.0 micrometers in diameter
 - c) 2 mm in diameter
 - d) 2 micrometers in diameter
- 8) In prokaryotic cells, ribosomes are _____.
 - a) 70 S
 - b) 80 S
 - c) 60S + 40S
 - d) 50S + 40S

- Q.2 Answer Any Four of the Following. 08**
- a) Write the names of various branches of Microbiology.
 - b) Define Bacterial Taxonomy.
 - c) What is the full form of NIV?
 - d) Define Bacteriophage.
 - e) Enlist the various National Institutes related to microbiology in India.
- Q.3 Write Short Notes on Any Two of the following. 08**
- a) Contributions of Antony Van Leuwenhoek in Microbiology
 - b) Theory of Spontaneous generation
 - c) Basic principles of nomenclature
- Q.4 Answer Any Two of the following. 08**
- a) Explain the general characteristics of viruses.
 - b) Write the four Koch's Postulates.
 - c) Give the economic importance of Algae and fungi.
- Q.5 Answer Any One of the Following. 08**
- a) Write the differences between prokaryotic and eukaryotic cell.
 - b) Explain the general characteristics of Actinomycetes and Archaeobacteria.

Seat No.	
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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
PHYSICS (Paper - II)
Optics (22221105)

Day & Date: Saturday, 13-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of log table or calculator is allowed.
 4) Draw Neat diagrams and give equations wherever necessary.

Q.1 Choose the correct alternatives from the followings:

08

- 1) In case of a lens producing spherical aberration _____ gives position of best possible image.
 - a) focus of paraxial rays
 - b) circle of least confusion
 - c) focus of marginal rays
 - d) axial rays
- 2) In Ramsden's eye-piece the distance between two plano-convex lenses is _____.
 - a) f
 - b) $2f$
 - c) $\frac{2}{3}f$
 - d) None of these
- 3) The fringes observed in case of wedge shaped thin film are _____.
 - a) equally spaced
 - b) of equal thickness
 - c) localized
 - d) equally spaced, localized and of equal thickness
- 4) A_{21} , B_{12} , B_{21} are _____.
 - a) Einstein's coefficients
 - b) Huygen's coefficients
 - c) Newton's coefficients
 - d) Bohr's coefficients
- 5) The spherical aberration of convex lens is _____.
 - a) positive
 - b) negative
 - c) positive as well as negative
 - d) none of these
- 6) In Ramsden's eye piece, two plano convex lenses are separated from each other by 8 cm. The position of the cross wire is at _____.
 - a) 24 cm
 - b) 9 cm
 - c) 3 cm
 - d) 4.5 cm
- 7) In case of parallel faced thin film, the condition for constructive interference from reflected light is _____.
 - a) $2\mu t \cos r = n\lambda$
 - b) $2\mu t \cos r + \frac{\lambda}{2} = n\lambda$
 - c) $2\mu t \cos r + \frac{\lambda}{2} = (2n + 1)\frac{\lambda}{2}$
 - d) $2 \sin \theta = n\lambda$
- 8) In He - Ne Laser, transition from E6 to E5 gives rise to lasers of wavelength _____.
 - a) $3.39 \mu m$
 - b) $1.15 \mu m$
 - c) 6328 \AA
 - d) $2.15 \mu m$

- Q.2 Answer any Four of the following.** **08**
- a) Distinguish between Fresnel and Fraunhofer diffraction.
 - b) Explain in short three quantum processes in Laser.
 - c) Explain any two methods of minimize spherical aberrations for lenses.
 - d) A soap film 2.5×10^{-5} thick with the angle of refraction is 30° . Find the maximum wavelength of the incident light for which the film appears dark due to the reflected light (given $\mu = 1.33$).
 - e) A convex lens has a mean focal length of 20 cm. Its material has $\mu_v = 1.65$ and $\mu_r = 1.63$. Find the axial chromatic aberration of the lens.
- Q.3 Answer any Two of the following.** **08**
- a) Two thin plano-convex lenses in Ramsden's eyepiece are separated from each other by 2 cm. calculate
 - i) the focal length of each lens
 - ii) the equivalent focal length
 - iii) the position of the cross wires
 - b) What is Fermat's principal of least time? Derive the law of reflection on the basis of Fermat's principal.
 - c) Write a note on Schuster's method.
- Q.4 Answer any Two of the following.** **08**
- a) What is chromatic aberration? Obtain an expression for axial longitudinal chromatic aberration of convex lens?
 - b) With a neat ray diagram explain the construction, working and use of Huygen's eyepiece. Why cross wires cannot be used in this eye piece.
 - c) Explain construction and working of Ruby Laser.
- Q.5 Answer any One of the following.** **08**
- a) Describe Newton's rings experiment for the determination of the wavelength of a monochromatic light.
 - b) What is plane diffraction grating? Describe experimental determination of wavelength of light by using a plane diffraction grating and a spectrometer. A parallel beam of monochromatic light having wavelength 6250\AA is incident normally on a plane transmission grating. If second order spectral line is observed at an angle of 30° , calculate the grating element.

Seat No.	
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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper - II)
Cell Cytology and Microbial Techniques (22221115)

Day & Date: Saturday, 13-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw a neat labeled diagram wherever necessary
 3) Figures to the right indicate full marks.

Q.1 Choose the correct alternative and rewrite the following sentences. 08

- 1) The bacterial cell when treated with lysozyme _____ are liberated
 - a) Spheroplasts
 - b) Protoplasts
 - c) L- forms
 - d) All of above
- 2) _____ take part in protein synthesis.
 - a) Ribosomes
 - b) Mesosomes
 - c) Endospore
 - d) Capsule
- 3) Numerical aperture of microscope is responsible to _____.
 - a) separate cells
 - b) magnify cells
 - c) gather light
 - d) None of above
- 4) In Maneval's capsule staining _____ dye is used.
 - a) Iodine
 - b) Congo red
 - c) Nigrosine
 - d) safranin
- 5) _____ is not an antiseptic.
 - a) Hydrogen peroxide
 - b) Ethyl alcohol
 - c) Dettol
 - d) Chlorine
- 6) _____ is used as a vapour phase disinfectant in enclosed spaces
 - a) Iodine
 - b) Copper
 - c) Beta propiolactone
 - d) Dettol
- 7) The outer membrane containing lipopolysaccharide is present in _____.
 - a) Gram positive bacteria
 - b) L forms
 - c) Gram negative bacteria
 - d) None of above
- 8) _____ is used in cosmetics and perfumes.
 - a) Chlorine
 - b) Ethyl alcohol
 - c) Copper
 - d) Ethylene oxide

Q.2 Answer any four of the following: 08

- a) Define protoplasts.
- b) What is resolving power?
- c) What is monochrome staining?
- d) Define microbiostasis.
- e) Draw a labelled diagram of ultrastructure of bacterial Endospore.

- Q.3 Write short notes on any two of the following. 08**
- a) Explain the detail structure of flagella.
 - b) Write an account on Gram positive cell wall of bacteria.
 - c) Describe the use of chlorine and iodine used for sterilization.
- Q.4 Answer any two of the following. 08**
- a) Write an account on cell wall staining by chance's method.
 - b) Give the difference between capsule and slime layer.
 - c) Explain the use of heavy metals to control the growth of microorganisms.
- Q.5 Answer any one of the following. 08**
- a) Describe the fluid mosaic model of cell membrane and give the functions of cell membrane
 - b) Explain the principle, working and application of compound microscope.

Seat No.	
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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
STATISTIC (Paper - I)
Descriptive Statistics - I (22221108)

Day & Date: Monday, 15-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Multiple choice questions:

08

- 1) Colors of flowers is an example of _____.
 a) Quantitative variable b) Qualitative variable
 c) Skewed variable d) Symmetric variable
- 2) The exact point of intersection of less than ogive curve and more than ogive curve is at _____.
 a) 5th Decile b) 50th Percentile
 c) Median d) All of these
- 3) With two attributes one can have in all: _____.
 a) Two class frequencies b) Four class frequencies
 c) Eight class frequencies d) Nine class frequencies
- 4) The mean of 1, 3, 4, 5, 7 and 4 is n , then the value of n is _____.
 a) 3 b) 4
 c) 5 d) 6
- 5) 20th percentile is equal to _____.
 a) Q_2 b) D_2
 c) D_3 d) None of these
- 6) The standard deviation of first 10 natural numbers is _____.
 a) 5.5 b) 3.87
 c) 2.97 d) 2.87
- 7) The first moment about $X = 0$ of a distribution is 12.08. The mean is _____.
 a) 10.80 b) 10.08
 c) 12.08 d) 12.88
- 8) The relation between μ_4 and μ_2 is $\mu_4 > 3\mu_2^2$ then the curve of the distribution is _____.
 a) Leptokurtic b) Platykurtic
 c) Mesokurtic d) Platykurtic and positively skewed

Q.2 Answer any four of the following.

08

- a) Define continuous variable and give one example of continuous variable.
- b) If the median of the distribution 10, 12, 13, 16, x , 20, 25, 30 is 18, then find the value of x .
- c) Define Range and coefficient of Range.
- d) Define positive attribute.
- e) Prove that second central moment is variance.

- Q.3 Write short notes on any two of the following.** **08**
- a) Explain the construction of ogive curves.
 - b) What is the effect of change of origin and scale on arithmetic mean?
 - c) Define Bowley's coefficient of skewness. Prove that it lies between - 1 and + 1.

- Q.4 Answer any two of the following.** **08**
- a) Prove for any discrete frequency distribution standard deviation is not less than mean deviation from mean.
 - b) If \bar{X}_1 and \bar{X}_2 are the means of two groups of sizes n_1 and n_2 respectively, derive the formula to obtain mean of $(n_1 + n_2)$ values pooled together.
 - c) Find the conditions of consistency of data related to two attributes A and B.

- Q.5 Answer any one of the following** **08**
- a) Define median and derive the formula for median in case of continuous frequency distribution.
 - b) Define Yule's coefficient of association (Q) and coefficient of colligation (Y) and show that

$$Q = \frac{2Y}{1 + Y^2}$$

Seat No.	
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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper - I)
Animal Diversity (22221122)

Day & Date: Monday, 15-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

Q.1 Multiple choice questions:

08

- 1) Habitat of phylum Echinodermata is _____.
 a) Exclusively marine b) Fresh water
 c) Estuarine d) All of these
- 2) Characteristics features of phylum Arthropoda _____.
 a) presence of appendages b) jointed appendages
 c) no appendages d) partial appendages
- 3) Sepia belongs to _____ class of phylum Mollusca.
 a) aplacophora b) gastropoda
 c) cephalopoda d) pelecypoda
- 4) Metamerically segmented body is character of phylum _____.
 a) Protozoa b) Porifera
 c) Platyhelminthes d) Annelida
- 5) Ascaris lubricoides is _____.
 a) pseudocoelomic b) acoelomic
 c) coelomic d) coelom absent
- 6) Tanea solium belongs to phylum _____.
 a) Arthropoda b) Annelida
 c) Platyhelminthes d) Echinodermata
- 7) In sycon body leave water through _____.
 a) ostia b) osculum
 c) spongocoel d) prosopyle
- 8) Nutrition in amoeba _____.
 a) hemizoic b) heterozoic
 c) parazoic d) holozoic

Q.2 Answer any four of the following.

08

- a) Saprozoic nutrition
- b) Tube foot
- c) General characters of protozoa
- d) Polymorphism in coelentera
- e) Pseudopodium

- Q.3 Write short notes on any two of the following.** **08**
- a) Explain economic importance of earthworm.
 - b) Describe general characters of Arthropoda.
 - c) Explain locomotion in paramecium.
- Q.4 Answer any two of the following.** **08**
- a) Describe life cycle of tapeworm.
 - b) Explain sycon canal system.
 - c) Describe nutrition in amoeba.
- Q.5 Answer any one of the following.** **08**
- a) Explain water vascular system in sea- star.
 - b) Parasitic adaptation in *Ascaris lubricoids*.

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
STATISTICS (Paper - II)
Elementary Probability Theory (22221109)

Day & Date: Tuesday, 16-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Choose the correct alternative:**08**

- 1) Let $A = \{2, 4, 6\}$ and $B = \{3, 6\}$ be any two events, then _____.
 - a) $A \cup B = \{2, 3, 4, 6\}$
 - b) $A \cap B = \{6\}$
 - c) $A \cap B = \varnothing$
 - d) Both a and b
- 2) Sample space of appearing for an examination till passing is _____ sample Space.
 - a) discrete
 - b) countably infinite
 - c) continuous
 - d) none of these
- 3) If a perfect coin is tossed twice the probability of getting two heads is _____.
 - a) Zero
 - b) $\frac{1}{8}$
 - c) 1
 - d) $\frac{1}{4}$
- 4) An urn contains 4 white and 1 black balls. If two balls are drawn at random, then probability of getting one white and one black ball is _____.
 - a) 0.4
 - b) 0.2
 - c) 0.1
 - d) 0.8
- 5) A number is selected at random from the set is $\{1, 2, 3, 4, \dots, 50\}$ What is the probability that selected number contains the digit 5.
 - a) $\frac{1}{50}$
 - b) $\frac{2}{50}$
 - c) $\frac{5}{50}$
 - d) $\frac{6}{50}$
- 6) Let A and B be two events defined on Ω and $P(B) > 0$ then $P(A|B) = \frac{P(A)}{P(B)}$ _____.
 - a) $B \subset A$
 - b) $A \cap B = \varnothing$
 - c) $A \subset B$
 - d) None of these
- 7) If A_1, A_2, A_3 form partition of sample space then they are _____.
 - a) pairwise independent
 - b) mutually independent
 - c) mutually exclusive
 - d) None of these
- 8) If $P(A|B)$ is same as $P(A)$, then A and B are _____.
 - a) Independent events
 - b) mutually exclusive events
 - c) elementary events
 - d) None of these

Q.2 Answer any Four of the following.

08

- a) Define Sample space.
- b) Define sure event and impossible event.
- c) Given $P(\bar{A} \cap B) = 0.1, P(A \cap \bar{B}) = 0.4, P(\bar{A} \cup \bar{B}) = 0.6$ compute $P(A)$.
- d) For any two events A and B . Define conditional probability $P(A/B)$.
- e) If $B \subset A$ then find $P(\bar{A} \cap B)$.

Q.3 Write short notes on any Two of the following.

08

- a) Two unbiased dice are thrown simultaneously. What is the probability that
 - 1) The sum $(X + Y)$ is greater than 9
where X : Number on first die
 - 2) The product (XY) is less than 4
 Y : Number on second die.
- b) A committee of 3 persons is to be formed from 5 persons A, B, C, D, E . Write down the events corresponding to the following:
 - 1) $E_1 = A$ is not selected in the committee
 - 2) $E_2 = B$ and C are not selected in the committee
- c) For any three events A, B and C . Prove that

$$P(A \cap B \cap C) = P(A) \cdot P(B/A) \cdot P(C/A \cap B)$$

Q.4 Answer any Two of the following.

08

- a) If A and B are any two events, then prove that $P(A \cup B) \leq P(A) + P(B)$
- b) If a fair coin and a fair die are tossed together. Let A be the event that there is a head on a coin and even number on a die and B be the event that the number on a die is greater than 4. Obtain
 - 1) Sample Space
 - 2) Events A and B
- c) Show that if A and B are independent events, then \bar{A} and \bar{B} are also independent events.

Q.5 Answer any One of the following.

08

- a) State and prove addition theorem of probability of two events. Write the expression for $P(A \cup B \cup C)$
- b) Show that conditional probability satisfies all the axioms of unconditional probability.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper - II)
Animal Diversity - II (22221123)**

Day & Date: Tuesday, 16-04-2024
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagram and give wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions:

08

- 1) _____ belongs to Urochordate.
 - a) Scoliodon
 - b) Herdmania
 - c) Amphioxus
 - d) Labeo
- 2) Cyclostome are without _____.
 - a) Gills
 - b) Dorsalfin
 - c) Jaws
 - d) Tailfin
- 3) A fish is characterized by the presence of _____.
 - a) Dermal scale
 - b) Pariedfins
 - c) Pharyngeal gills
 - d) All the above
- 4) Frog belongs to the class _____.
 - a) Aves
 - b) Amphibia
 - c) Pisces
 - d) Mammalia
- 5) Poison gland of snake are modified _____.
 - a) Sebaceous gland
 - b) Mucous gland
 - c) Salivary gland
 - d) Endocrine gland
- 6) Golden age of reptiles was _____.
 - a) Coenozoic era
 - b) Paleozoic era
 - c) Mesozoic era
 - d) Proterozoic era
- 7) Pneumatic bone is the feature of _____.
 - a) Flying fish
 - b) Flying lizard
 - c) Flying bird
 - d) Flying mammal
- 8) External ears are characteristic of _____.
 - a) Birds
 - b) Mammals
 - c) Reptiles
 - d) Pisces

Q.2 Answer any four of the following.

08

- a) Fundamental chordate character
- b) Agnatha
- c) Petromyzon
- d) Cartilaginous fishes
- e) Chameleon
- f) Anura

- Q.3 Write short notes on any two of the following. 08**
- a) Cephalochordata
 - b) *Naja naja*
 - c) Morphological adaptation in birds
- Q.4 Answer any two of the following. 08**
- a) Economic importance of fishes
 - b) Give general characters of Reptilia.
 - c) Aerial habitat in mammal
- Q.5 Answer any one of the following. 08**
- a) Describe Poisonous-nonpoisonous snake with suitable examples.
 - b) Give an account of the general characters of the class mammals.

Q.2 Attempt any four of the following. **08**

- a) Define the term characteristic matrix and characteristic equation of a matrix.
- b) Find the characteristic equation of a matrix $A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$
- c) Find the eigen vector for the matrix $\begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$
- d) Express the complex number $1 + \sqrt{3}i$ in a polar form.
- e) Prove that, e^z is a periodic function with period $2\pi i$.
- f) In a group G , prove that $(ab)^{-1} = b^{-1}.a^{-1}$ for all $a, b \in G$

Q.3 Attempt any two of the following. **08**

- a) Verify that, the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$ satisfies its characteristic equation.
Also find A^{-1} .
- b) Find all the 5th roots of unity.
- c) Let \mathbb{Z} be a set of integers then show that $(\mathbb{Z}, +)$ is a group. Is it an abelian group?

Q.4 Attempt any two of the following. **08**

- a) Prove that, $\cos z = \frac{e^{iz} + e^{-iz}}{2}$, $\sin z = \frac{e^{iz} - e^{-iz}}{2i}$
- b) Investigate for what values of λ and μ , the following system of equations.
 $2x + 3y + 5z = 9$, $7x + 3y - 2z = 8$, $2x + 3y + \lambda z = \mu$ will have
 - i) no solution
 - ii) a unique solution
 - iii) infinite number of solutions
- c) Find rank of the matrix $\begin{bmatrix} 1 & 3 & 4 & 5 \\ 1 & 2 & 6 & 7 \\ 1 & 5 & 0 & 10 \end{bmatrix}$

Q.5 Attempt any one of the following questions. **08**

- a) State and prove Cayley-Hamilton's theorem and verify it for $\begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$
- b) State and prove De Moivre's theorem and hence show that if $2 \cos \theta = x + \frac{1}{x}$
then $x^n + \frac{1}{x^n} = 2 \cos n \theta$

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
BOTANY (Paper - I)
Microbiology and Phycology (22221102)

Day & Date: Thursday, 18-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of logarithm table and calculator is allowed.

Q.1 Rewrite the following sentences choosing correct alternative.

08

- 1) *Sargassum* reproduces sexually by _____ type.
 - a) isogamous
 - b) anisogamous
 - c) oogamous
 - d) None of the above
- 2) Oogonium of *Sargassum* has _____ layered wall.
 - a) one
 - b) three
 - c) two
 - d) four
- 3) *Spirogyra* reproduces sexually by _____ method.
 - a) isogamous
 - b) anisogamous
 - c) oogamous
 - d) all the above
- 4) In *Spirogyra*, the scalariform conjugation occurs in _____ species
 - a) dioecious
 - b) monoecious
 - c) homothallic
 - d) none of these
- 5) Male sex organ of *Vaucheria* is _____.
 - a) antheridium
 - b) ascogonium
 - c) oogonium
 - d) archegonium
- 6) *Vaucheria* belongs to the class _____.
 - a) Chlorophyceae
 - b) Rhodophyceae
 - c) Cyanophyceae
 - d) Euglenophyceae
- 7) Polar nodules are formed inside the _____.
 - a) heterocyst
 - b) akinetes
 - c) resting spores
 - d) all of these
- 8) Hormogones in *Nostoc* play an important role in _____ reproduction
 - a) sexual
 - b) vegetative
 - c) asexual
 - d) all of these

Q.2 Answer any four of the following.

08

- a) What is virus?
- b) Define mycoplasma.
- c) What is basillus?
- d) Write the class and family of *spirogyra*.
- e) Give the division and class name of *sargassum*.
- f) Write the definition of phycology.

- Q.3 Write short notes on any two of the following. 08**
- a) General character of Vaucheria
 - b) Significance of mycoplasma
 - c) Classification of plant virus
- Q.4 Answer any two of the following. 08**
- a) Explain the economic importance of bacteria.
 - b) Give the structure of mycoplasma.
 - c) Describe the lateral conjugation method in *Spirogyra*.
- Q.5 Answer any one of the following. 08**
- a) Describe the thallus structure of Nostoc.
 - b) Explain economic importance of algae.

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper - II)
Calculus (22221117)

Day & Date: Friday, 19-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Choose the correct alternative for each of the following.

08

1) $\lim_{x \rightarrow 0} \frac{3^x - 2^x}{x} = \underline{\hspace{2cm}}$.

a) 1

b) $\frac{3}{2}$

c) $\log 3$

d) $\log\left(\frac{3}{2}\right)$

2) The expansion of $\log(1+x)$ is _____.

a) $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \frac{x^5}{5} - \frac{x^6}{6} + \dots$

b) $x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \frac{x^5}{5} + \frac{x^6}{6} + \dots$

c) $x - \frac{x^2}{2} - \frac{x^3}{3} - \frac{x^4}{4} - \frac{x^5}{5} - \frac{x^6}{6} - \dots$

d) $\frac{x^2}{2} - \frac{x^4}{12} + \frac{x^6}{45} - \dots$

3) The degree of the homogenous function $u = \frac{x^{\frac{1}{3}} + y^{\frac{1}{3}}}{x^{\frac{1}{5}} - y^{\frac{1}{5}}}$ is _____.

a) $\frac{1}{15}$

b) $\frac{2}{15}$

c) $\frac{5}{3}$

d) $\frac{3}{5}$

4) If $f(x, y) = 2x^2 - xy + 2y^2$ then $\frac{\partial f}{\partial x}$ at $(1, 2) = \underline{\hspace{2cm}}$.

a) 2

b) -2

c) 0

d) 10

5) $\int_0^{\frac{\pi}{6}} \sin^6 3x \, dx = \underline{\hspace{2cm}}$

a) $\frac{\pi}{96}$

b) $\frac{96}{5\pi}$

c) $\frac{5\pi}{96}$

d) $\frac{5}{96}$

Q.5 Attempt any one of the following questions.

a) State and prove the Leibnitz's theorem.

b) If $u = \tan^{-1}\left(\frac{x^3+y^3}{x-y}\right)$, $x \neq y$ then show that

i)
$$x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \sin 2u$$

ii)
$$x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = (1 - 4 \sin^2 u) \sin 2u$$

- Q.3 Write short notes on any two of the following.** **08**
- a) Thallus structure of mucor.
 - b) Economic importance of bryophytes.
 - c) T. S. of Selaginella stem.
- Q.4 Answer any two of the following.** **08**
- a) Give the general characters of Basidiomycotina.
 - b) Explain T. S. of cycas leaflets.
 - c) Explain asexual reproduction in yeast.
- Q.5 Answer any one of the following.** **08**
- a) Describe the structure of antheridium and archegonium in Riccia and add a note on fertilization.
 - b) Describe in brief with respect to occurrence, thallus organisation and asexual method of reproduction in agaricus.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper – I)**

Basic Circuit Theory and Network Analysis (22221118)

Day & Date: Saturday, 20-04-2024
Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions.

08

- 1) _____ is used as an electromechanical switch?
 - a) Capacitor
 - b) Relay
 - c) Fuse
 - d) Transformer
- 2) In a pure capacitive circuit, the current is _____ with voltage.
 - a) In Phase
 - b) Out of Phase
 - c) Leading
 - d) Lagging
- 3) Parallel resonance circuit is also called a _____ circuit.
 - a) Acceptor
 - b) Current Magnifier
 - c) Voltage Magnifier
 - d) None of these
- 4) Norton's equivalent resistance (R_N) is found by _____.
 - a) Removing the load resistance and open the output terminal
 - b) Replacing the voltage sources with their internal resistances
 - c) Replacing the current sources with their internal resistance
 - d) Both (b) and (c)
- 5) The Y parameters are called _____ parameters.
 - a) Admittance
 - b) ABCD
 - c) Hybrid
 - d) Impedance
- 6) The colour code for a $10\text{ K}\Omega \pm 10\%$ resistor is _____.
 - a) Brown, Black, Red and Sliver.
 - b) Brown, Black, Brown and Sliver.
 - c) Brown, Black, Orange and Sliver.
 - d) Brown, Black, Black and Sliver.
- 7) A sinusoidal AC current has a maximum value of 100 Amp then its RMS value is _____.
 - a) 70.7 amps
 - b) 141.44 amps
 - c) 10 amps
 - d) 100 amps
- 8) The hybrid parameter h_{11} is called _____.
 - a) Output Conductance
 - b) Reverse voltage gain
 - c) Input impedance
 - d) Forward current gain

Q.2 Answer any four of the following.

08

- What is resistance? State its unit.
- A series resonance circuit has a resonating frequency of 160 KHz and a quality factor of 4. Calculate its bandwidth.
- Define the term "In Phase" and "Out of Phase".
- State Maximum Power Transfer Theorem.
- Enlist impedance parameters with their units.
- State Superposition Theorem.

Q.3 Write short notes on any two of the following.

08

- Phase relationship between current and voltage in pure resistive circuit.
- Series resonance circuit.
- Voltage sources.

Q.4 Answer any two of the following.

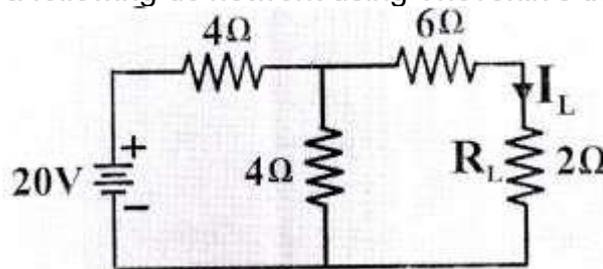
08

- What is capacitance? State its unit. Give the classification of capacitor.
- A series LCR circuit has an inductor of 100 mH, capacitor of 100 μ f and resistance of 100 Ω is operated with 230 V, 50 Hz AC supply. Calculate the resonating frequency.
- Compare series and parallel resonance circuit

Q.5 Answer any one of the following questions.

08

- State Thevenin's theorem. Calculate the current flowing through load resistance R_L of a following dc network using Thevenin's theorem.



OR

- Give construction and working of step-up and step-down transformer.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
GEOGRAPHY (Paper – I)
Geomorphology – I (22221124)**

Day & Date: Saturday, 20-04-2024
Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Select the proper alternative from the following and fill in blanks. 08

- 1) Geomorphology is a branch of _____ Geography.
 - a) Economic
 - b) Physical
 - c) Political
 - d) Human
- 2) The layer situated between crust and core is known as _____.
 - a) Sial
 - b) Sima
 - c) Nife
 - d) Conrad
- 3) The average density of the earth is _____ gram³c.m.
 - a) 5.5
 - b) 4.5
 - c) 7.5
 - d) 6.5
- 4) Igneous rock are called as _____ rocks.
 - a) Sedimentary
 - b) Primary
 - c) Quaternary
 - d) Tertiary
- 5) The continental drift theory is presented by _____.
 - a) Blache
 - b) Ratzel
 - c) Semple
 - d) Wegner
- 6) Earthquakes are measured with a _____.
 - a) Thermometer
 - b) Seismograph
 - c) Barograph
 - d) Thermograph
- 7) Volcano and _____ are called as sudden forces.
 - a) Fold
 - b) Earthquake
 - c) Fault
 - d) Landside
- 8) Stromboli is an example of _____ type of volcano.
 - a) Active
 - b) Positive
 - c) Dormant
 - d) Extint

Q.2 Answer any Four of the following. 08

- a) Definition of Geomorphology.
- b) Types of Rocks.
- c) Block Mountain.
- d) Definition of Fold.
- e) Materials ejected by Volcanoes.

Q.3 Write short notes on any Two of the following. 08

- a) Nature of Geomorphology.
- b) Interior structure of the Earth.
- c) Describe the types of sedimentary rock.

Q.4 Answer any Two of the following.

08

- a) Explain the importance of Geomorphology.
- b) Describe the types of Faults.
- c) Describes the concept Wegener's continental drift theory.

Q.5 Answer any One of the following.

08

- a) What is Earthquake? Explain its causes and effects.
- b) Define the Igneous rocks? Describe types of Igneous rocks.

- Q.3 Write short notes on any two of the following. 08**
- a) Propagation of Seismic waves.
 - b) Product of volcano
 - c) Seismograph and seismogram.
- Q.4 Answer any two of the following. 08**
- a) Explain the tidal theory of earth origin.
 - b) Describe rock cycle.
 - c) Describe classification of earthquake.
- Q.5 Answer any one of the following. 08**
- a) Describe scale of earthquake.
 - b) Describe the earth interior.

- Q.2 Answer any four of the following. 08**
- a) In signed binary numbers, the number 10010000 represents what decimal? Justify.
 - b) The binary number 10110111 produces even or odd parity? Justify.
 - c) Draw the logic diagram and truth table for Ex-NOR gate.
 - d) Write the equation to represent associative and distributive laws of Boolean algebra.
 - e) Explain any two Boolean rules.
- Q.3 Write short notes on any two of the following. 08**
- a) DeMorgan's theorems.
 - b) Gray Code
 - c) Binary to Gray conversion.
- Q.4 Answer any two of the following. 08**
- a) Draw the block diagram of digital computer and explain.
 - b) Discuss the universality of NAND gate.
 - c) The given Boolean expression is $\bar{A}\bar{B}\bar{C} + \bar{A}B\bar{C} + A\bar{B}\bar{C} + ABC\bar{C}$. Reduce the equation using Karnaugh map method.
- Q.5 Answer any one of the following. 08**
- a) Discuss in detail, the full-subtractor.
 - b) Explain NAND and Ex-OR gates. Draw the pin diagrams of the corresponding IC's.

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
GEOGRAPHY (Paper – II)
Geomorphology – II (22221125)

Day & Date: Monday, 22-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Multiple choice questions.

08

- 1) According to the cycle of erosion, the landforms have _____ changes through time.
 - a) Sudden
 - b) Abrupt
 - c) Sequential
 - d) Random
- 2) The evolution of surface features of the earth are studied in _____.
 - a) Hydrology
 - b) Pedology
 - c) Geomorphology
 - d) Climatology
- 3) Delta is formed due to the depositional work of _____.
 - a) Wind
 - b) Glacier
 - c) River
 - d) Underground water
- 4) Sea cliff is formed due to the _____ work of sea water.
 - a) Depositional
 - b) Erosional
 - c) Transportation
 - d) Mass wasting
- 5) _____ landform is formed due to the depositional work of glacier.
 - a) Mushroom rock
 - b) Drumline
 - c) Delta
 - d) Fiord
- 6) _____ landform is formed due to erosional work of wind.
 - a) Mushroom rock
 - b) Delta
 - c) Plains
 - d) Waterfall
- 7) _____ Which type of mass movement occurs on precipitous to vertical slope?
 - a) Creep
 - b) Rapid flowage
 - c) Sliding
 - d) Toppling
- 8) _____ is not an agent of biological weathering.
 - a) Rainfall
 - b) Human
 - c) Vegetation
 - d) Animals

Q.2 Write Short Answer. (Any Four)

08

- a) Define weathering.
- b) Explain the types of mass wasting.
- c) Define the karst topography.
- d) State the erosional landforms of river.
- e) Define the Sand Dunes.
- f) State the depositional landforms of sea waves.

- Q.3 Write Short notes on any Two of the following.** **08**
- a) Explain the depositional landforms of glacial.
 - b) Describe the causes of mass wasting.
 - c) Describe the Cycle of Erosion.
 - d) Describe the chemical weathering.
- Q.4 Write answer any Two of the following.** **08**
- a) Explain the biological weathering.
 - b) Describe the depositional landforms of river.
 - c) Describe the erosional landforms of karst.
- Q.5 Write answer any one of the following.** **08**
- a) Define physical weathering and state its types with examples.
 - b) Describe the erosional landforms formed by wind.

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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Paper - II)
Palaeontology (22221111)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw net diagram wherever necessary.
 3) Figures to the right indicates full marks.

Q.1 Select correct one.**08**

- 1) In trilobite glabella is placed in the _____ Part of the shell.
 - a) head shield
 - b) Thorax
 - c) Pygidium
 - d) None of these
- 2) Fossil trinucleus is belongs to the _____ phylum.
 - a) Gastropod
 - b) Echinodermata
 - c) Brachiopod
 - d) Arthropod
- 3) In echinoderm one of the genital plate provide with number of pore like opening is described as _____.
 - a) ocular plate
 - b) Corona
 - c) mederporic plate
 - d) None of these
- 4) The central lobes of trilobite is described as _____.
 - a) anterior lobe
 - b) pleural lobe
 - c) axil lobe
 - d) All of these
- 5) Which process of formation of fossils involves molecule by molecule replacement?
 - a) Petrification
 - b) mould & casts
 - c) Carbonization
 - d) Imprints
- 6) In physa _____ coiling is observed.
 - a) Sinistral
 - b) Spire
 - c) Dextral
 - d) none of these
- 7) Remains of ancient organisms preserved in the rocks are called as _____.
 - a) Minerals
 - b) Dyke
 - c) Fossils
 - d) Crystals
- 8) Species cardita belongs to _____ Class.
 - a) Gastropod
 - b) Cephalopoda
 - c) Lamellibranches
 - d) none of these

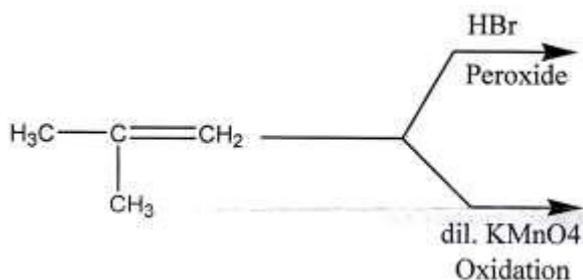
Q.2 Answer any four of the following.**08**

- a) Define paleontology.
- b) Name the fossils of gastopods.
- c) What is aperture in fossil?
- d) Write two conditions of fossilization.
- e) Describe goniatile.

- Q.3 Write short notes on any two of the following. 08**
- a) Carbonation
 - b) Cardium
 - c) Mould and cast
- Q.4 Answer any two of the following. 08**
- a) Describe the Glossopteris and gangamopeteris.
 - b) Describe the lamellibranches.
 - c) Describe the tubipora.
- Q.5 Answer any one of the following. 08**
- a) Describe uses of fossils
 - b) Describe trilobites of fossil.

- Q.2 Answer the following question briefly. (Any Four) 12**
- a) What are the important qualities of the best discourse?
 - b) What biographies Bertrand Russell refers to in the beginning of his essay?
 - c) Why did Rabindranath Tagore consider that America couldn't understand 'freedom'?
 - d) How has Niyi Osundare described the destruction of water and soil?
 - e) Describe any two qualities of a simple life by Alexander Pope.
 - f) How did Christina Rossetti want her partner to remember her?
- Q.3 a) Write a letter applying for the job of a teacher of Mathematics at a school in Pune. Address the letter to the Head Master of the school. 10**
- OR**
- b) Write a letter addressing the editor of The Times of Nation on the recent editorial which you liked the most.**
- Q.4 What is interpersonal intelligence? Write a detailed note on it. 10**

- d) Why are meso compounds optically inactive?
 e) Predict the products for the following reaction.



Q.3 Write short notes on any Two of the following.

08

- a) What is the effect of,
 i) Cl_2/light ,
 ii) HBr ,
 iii) $\text{Conc. H}_2\text{SO}_4$,
 iv) $\text{H}_2, \text{Ni}, 80^\circ\text{C}$ on cyclopropane
 b) What is steric effect? Explain steric effect with respect to Mesitoic acid
 c) Discuss the optical isomerism of 2,3-dihydroxy butanoic acid.

Q.4 Answer any two of the following.

08

- a) Define hybridization. Explain the formation of C_2H_2 molecule on the basis of hybridization.
 b) What is optical activity? Explain the elements of symmetry with examples.
 c) Explain the different types of reagents with suitable examples.

Q.5 Answer any one of the following.

08

- a) What are dienes? Discuss their classification by giving suitable example. Give methods of preparation of 1,3-butadiene.
 b) Discuss the mechanism involved in-
 i) Nitration of benzene
 ii) Friedel-Crafts alkylation

- Q.3 Write short notes on any two of the following. 08**
- a) List tag in HTML
 - b) CSS Display
 - c) JavaScript - Dialog Boxes
- Q.4 Answers any two of the following. 08**
- a) Explain CSS Position properties with example.
 - b) Explain features of JavaScript.
 - c) Explain different selectors in CSS.
- Q.5 Answers any one of the following. 08**
- a) Explain graphics tag with example.
 - b) Explain History object in JavaScript.

- Q.3 Write short notes on Any Two of the following.** **08**
- a) Describe Kjeldahl's method for the estimation of Nitrogen in an organic compound.
 - b) Give the experimental determination of surface tension.
 - c) Discuss with example different types of titrimetric analysis.
- Q.4 Answer Any Two of the following.** **08**
- a) What is adulteration of milk? Discuss adulterants used in milk.
 - b) What is chromatography? Discuss in detail with respect to technique and methodology of paper chromatography?
 - c) Explain the procedure for preparation of 250 ml of 1N oxalic acid (molecular wt. 126g)
- Q.5 Answer Any One of the following.** **08**
- a) How Sulphur is estimated by Carius method? Explain with reactions.
 - b) **Short Notes on**
 - 1) Additive and constitutive properties
 - 2) Polar and non-polar molecules
 - 3) Application of dipole moment

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper - IV)
Operating System (22221230)

Day & Date: Monday, 13-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Multiple choice questions:

08

- 1) Bankers Algorithm is used to _____ Deadlock in OS.
 - a) prevent
 - b) detect
 - c) avoid
 - d) recover
- 2) Inter process communication can be done through _____.
 - a) Mails
 - b) Texts
 - c) System calls
 - d) Traps
- 3) Which one of the following is the address generated by CPU?
 - a) Physical address
 - b) absolute address
 - c) Logical address
 - d) none of the mentioned
- 4) CPU can only execute Programs which are stored in _____.
 - a) Hard disk
 - b) Floppy drive
 - c) Job queue
 - d) Main memory
- 5) The total time spent by process in the ready queue is called as _____.
 - a) Turnaround time
 - b) Response time
 - c) Waiting time
 - d) None
- 6) Which is not the state of a process of the following?
 - a) Ready
 - b) Old
 - c) Waiting
 - d) Running
- 7) FIFO scheduling is _____.
 - a) preemptive scheduling
 - b) Non- preemptive scheduling
 - c) deadlock scheduling
 - d) None of these
- 8) Using Overlays, we can execute big programs into small memory.
 - a) TRUE
 - b) FALSE

Q.2 Solve Any FOUR questions.

08

- a) What is process?
- b) Define Multiprogramming.
- c) What is thread?
- d) What is swapping?
- e) State the term Context Switching.
- f) What is deadlock?

Q.3 Solve Any TWO questions.

08

- a) Define Fragmentation with its types.
- b) Explain Process State Life Cycle.
- c) Explain dining philosopher problem.

- Q.4 Solve Any TWO questions.** **08**
- a) List out differences between User Thread and Kernel Thread.
 - b) Explain Paging in brief.
 - c) Explain FCFS Scheduling algorithm with Example.
- Q.5 Solve Any ONE question.** **08**
- a) What is Operating System? Explain Services provided by Operating System.
 - b) Explain PCB with Diagram.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
PHYSICS (Paper – III)
Heat and Thermodynamics (22221205)

Day & Date: Tuesday, 14-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Neat diagrams must be drawn wherever necessary.
 4) Use of log table or calculator is allowed.

Q.1 Choose correct alternative.

08

- 1) The relation of the coefficient of viscosity and coefficient of thermal conductivity is given by _____.
 - a) $K = 2\eta C_v$
 - b) $K = \eta C_v$
 - c) $K = \frac{1}{2}\eta C_v$
 - d) $K = 3\eta C_v$
- 2) The mean free path of a gas molecule is inversely proportional to _____.
 - a) square of diameter of a gas molecule
 - b) square root of diameter of a gas molecule
 - c) diameter of a gas molecule
 - d) fourth power of molecular diameter
- 3) Cooling by adiabatic demagnetization of paramagnetic salt is called _____.
 - a) fountain effect
 - b) magnetic effect
 - c) second sound
 - d) magneto-caloric effect
- 4) Third law of thermodynamic is related to _____.
 - a) Absolute zero temperature
 - b) zero-point entropy
 - c) zero point energy
 - d) all a, b, c
- 5) In adiabatic expansion, internal energy _____.
 - a) remains constant
 - b) increases
 - c) becomes equal to zero
 - d) decreases
- 6) A heat engine with 100% efficiency is practically _____.
 - a) possible
 - b) impossible
 - c) some time possible
 - d) some time impossible
- 7) The action of refrigerator is opposite to _____.
 - a) air conditioning machine
 - b) heat engine
 - c) thermocouple
 - d) Thermostat
- 8) The art of controlling weather within limited space is called _____.
 - a) refrigerator
 - b) heat engine
 - c) weather detector
 - d) air conditioning

- Q.2 Answer Any Four of the following.** **08**
- a) Define heat engine and give its types.
 - b) Define coefficient of performance of refrigerator.
 - c) Define reversible and irreversible processes with examples.
 - d) What are the properties of liquid helium-II
 - e) State Joule-Thomson effect
- Q.3 Write short notes on Any Two of the following.** **08**
- a) Linde's air liquefier.
 - b) Isothermal and adiabatic process.
 - c) Vapour compression refrigerator
- Q.4 Answer Any Two of the following.** **08**
- a) State and prove zeroth law of thermodynamics.
 - b) Define cooling by adiabatic demagnetization. Describe experimental set up for adiabatic demagnetization of paramagnetic substance.
 - c) Derive adiabatic relations.
- Q.5 Answer any One of the following.** **08**
- a) Define coefficient of viscosity and obtain an expression for it on the basis of transport phenomena. Determine coefficient of viscosity of nitrogen at N.T. P.
[Given Density= $1.2 \frac{kg}{m^3}$, mean free path= $8.5 \times 10^{-8}m$, average velocity= 453.3 m/s.
 - b) Describe diesel cycle and deduce an expression for its efficiency. A engine performs 2200J of mechanical work and rejects 4200J of heat at every cycle. Calculate
 - 1) How much heat supplied to engine in each cycle?
 - 2) What is the efficiency of engine.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper-III)
Microbial Metabolism and Cultivation (22221220)

Day & Date: Tuesday, 14-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagram and give equations wherever necessary.

Q.1 Multiple choice questions.

08

- 1) Hydrolysis of phosphate groups in ATP is an _____ process.
 - a) exergonic
 - b) endergonic
 - c) reduction
 - d) oxidation
- 2) Anticodons are present on _____.
 - a) m-RNA
 - b) t-RNA
 - c) r-RNA
 - d) DNA
- 3) DNA contains _____ sugar
 - a) ribose
 - b) deoxyribose
 - c) hexose
 - d) triose
- 4) β -pleated sheets are the examples of _____ structure of protein.
 - a) Primary
 - b) Secondary
 - c) Tertiary
 - d) Quaternary
- 5) The color of Andrade's indicator in alkaline condition is _____.
 - a) pink
 - b) yellow
 - c) blue
 - d) green
- 6) Amylase is _____.
 - a) intracellular enzyme
 - b) extracellular enzyme
 - c) apoenzyme
 - d) coenzyme
- 7) Induced fit hypothesis was proposed by _____.
 - a) Fischer
 - b) Koshland
 - c) Crick
 - d) Watson
- 8) Nitrogen source for growth is provided by _____ in culture media
 - a) starch
 - b) NaCl
 - c) blood
 - d) peptone

Q.2 Answer any Four of following.

08

- a) Mention two functions of lipids.
- b) What is active site of enzyme?
- c) Name any two monosaccharides.
- d) What are apoenzymes?
- e) What are autotrophs?
- f) What is living media?

- Q.3 Write short note on any Two of the following. 08**
- a) EMP pathway
 - b) Lock and Key hypothesis
 - c) Primary structure of proteins
- Q.4 Answer any Two of following. 08**
- a) Write a note on "Nitrogen bases of DNA"
 - b) Discuss about "Differential, and Selective media"
 - c) Write a note on "Extracellular enzymes"
- Q.5 Answer any One of following. 08**
- a) Describe in detail about "High energy compounds"
 - b) Describe the structure and function of t RNA

Q.3 Write short notes on any Two of the following. 08

- a) Write note on Owens Bridge.
- b) What is damping in B.G.? Explain how it can be corrected.
- c) Series L-C-R circuit is connected to a variable frequency 230 V ac. $L=5$ H, $C=80\mu\text{f}$, $R=40\Omega$.
Find:
 - 1) Resonant frequency
 - 2) Quality factor

Q.4 Answer any Two of the following. 08

- a) Derive an expression for growth of charge containing a resistance, a capacitor and source of constant e.m.f. E in series.
- b) Explain working of Common Emitter transistor amplifier.
- c) Explain the working of positive and negative clippers.

Q.5 Answer any One of the following. 08

- a) Draw neat labeled diagram of Bridge rectifier and explain its operation with ripple factor and rectification efficiency.
- b) Discuss parallel resonant circuit. Show that at resonance the impedance is maximum and hence the current in the circuit is minimum. Explain why the circuit is called rejector circuit.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper - IV)
Applied Microbiology (22221221)

Day & Date: Wednesday, 15-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Rewrite the sentences by choosing correct alternatives.**08**

- 1) _____ is waterborne disease.

a) Typhoid	b) Rabies
c) Tuberculosis	d) AIDS
- 2) Identification of fecal and nonfecal coliform is carried out by _____.

a) MBRT	b) IMViC
c) MPN	d) MR
- 3) Living objects involved transmission of diseases are called _____.

a) carriers	b) vectors
c) fomites	d) parasites
- 4) When the disease occurs in very large population throughout the world is _____.

a) epidemic	b) sporadic
c) endemic	d) pandemic
- 5) _____ is a typical coliform.

a) <i>Enterobacter erogenes</i>	b) <i>E coli</i>
c) <i>Salmonella</i>	d) <i>Shigella</i>
- 6) _____ is opportunistic pathogen.

a) <i>E coli</i>	b) <i>Mycobacterium tuberculosis</i>
c) <i>Streptococcus pneumoniae</i>	d) AIDS Virus
- 7) _____ is used in indole test.

a) Nutrient broth	b) Milk broth
c) Peptone water	d) Starch broth
- 8) _____ is air borne disease.

a) Cholera	b) Rabies
c) Tick fever	d) Tuberculosis

Q.2 Answer any four of the following.**08**

- a) Fecal pollution
- b) Chronic infection
- c) Pathogenecity
- d) COD
- e) Epidemic disease

- Q.3 Answer any Two of the following.** **08**
- a) Sources of microorganisms in water.
 - b) Mixed and reinfection.
 - c) What is food borne disease, list different food borne diseases.
- Q.4 Answer any Two of the following.** **08**
- a) Define sewage, which are the different types of sewage.
 - b) Mortality and Morbidity rate.
 - c) Write on air borne diseases.
- Q.5 Answer any One of the following.** **08**
- a) Explain in detail mode of transmission of diseases.
 - b) Write about municipal water purification process.

Q.2 Answer any four of the following. **08**

- a) Define negative correlation with suitable example
- b) If Karl Pearson's coefficient of correlation between X and Y is 0.85, standard deviation of Y is 5 and variance of X is 64. Find covariance between X and Y .
- c) State the expression for the acute angle between two regression lines and discuss the case when $r = \pm 1$
- d) If the $V(X) = 25$, $r_{xy} = 0.25$ and $b_{xy} = 0.5$. Find the covariance between X and Y .
- e) Define Fisher's quantity numbers.

Q.3 Write short note on any two of the following. **08**

- a) What is the effect of change of origin and scale on regression coefficient?
- b) State any two properties of regression coefficient. Prove any one of them.
- c) Write a note on Cost of living index number.

Q.4 Answer any two of the following **08**

- a) Explain scatter diagram
- b) The equations of two regression lines are $3X + 2Y + 26$ and $6X + Y = 31$
Find
 - i) Means of X and Y
 - ii) Coefficient of correlation between X and Y .
- c) Explain the weighted aggregate method of calculating index number.

Q.5 Answer any One of the following. **08**

- a) With usual notation, prove that

$$R = 1 - \frac{6 \sum d_i^2}{n^3 - n}$$

- b) Obtain the expression for the acute angle θ between the two regression lines. Interpret the results $\theta = 0$, $\theta = \frac{\pi}{2}$.

- Q.3 Write Short Notes on Any Two of the following. 08**
- 1) Describe structure of alimentary canal of mammal.
 - 2) Describe structure and functions of swim bladder in fish.
 - 3) Describe V.S. of skin of mammals.
- Q.4 Answer Any Two of the following. 08**
- 1) Describe pectoral girdle of amphibians.
 - 2) Describe air sacs in birds.
 - 3) Describe metanephric kidney.
- Q.5 Attempt Any One of the following. 08**
- 1) Describe structure and functions of brain of Pisces.
 - 2) Describe in detail the structure and function of appendicular skeleton in frog.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
STATISTICS (Paper – IV)
Discrete Probability Distribution (22221212)

Day & Date: Friday, 17-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All Questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of calculator is allowed.

Q.1 Choose the correct alternative.**08**

- 1) Which of the following is a probability distribution?

a) (0.2, 0.2, 0.7)	b) (0.7, 0.2, 0.1)
c) (0.2, 0.1, 0.9)	d) (0.1, 0.6, 0.2)

- 2) The p. m. f. of r. v. X is given

X:	-1	0	1
P(x):	1/3	1/3	1/3

 then the mean and variance of X is

a) (1/3, 0)	b) (1/3, 1/3)
c) (0, 1/3)	d) (0, 2/3)

- 3) If $P(x) = \frac{1}{5} \quad x = 10, 20, 30, 40, 50$
 $\quad \quad \quad = 0 \quad \text{otherwise}$
 then the distribution of r.v. X is identical to _____ Distribution.

a) Discrete uniform	b) Binomial
c) Hyper-geometric	d) Two point

- 4) If X has hyper geometric distribution with (20,8,5) then its mean is _____.

a) 8	b) 2
c) 4	d) 5

- 5) The p. g. f. of Binomial distribution with parameters (n, p) is _____.

a) $q + ps$	b) $q + ps^n$
c) $p + qs^n$	d) $(q + ps)^n$

- 6) For which distribution mean and variance are same.

a) Uniform distribution	b) Binomial distribution
c) Poisson distribution	d) Geometric distribution

- 7) If X is a geometric r.v. then $P \left[X \geq 6 / X \geq 3 \right]$ is equal to _____.

a) $P[X \geq 6]$	b) $P[X \geq 3]$
c) $P[X \geq 6] / P[X \geq 3]$	d) $P[X \geq 2]$

- 8) If $X \sim NB(k, p)$ such that $E(X) = 9$ and $V(X) = 36$, then

a) $k = 9, p = \frac{1}{3}$	b) $k = 3, p = \frac{1}{4}$
c) $k = 36, p = \frac{1}{4}$	d) $k = 3, p = \frac{1}{3}$

Q.2 Answer any Four of the following.

- Define Median and Mode of discrete random variable X .
- Define expectation of function of random variable X .
- State mean and variance of uniform distribution.
- Define Hyper-geometric distribution.
- Show that geometric distribution is particular case of negative binomial distribution.

Q.3 Write short note on any Two of the following.

- A discrete r. v. X has the following probability distribution

$X:$	-2	-1	0	1	2	3
$P(x):$	0.1	k	0.2	$2k$	0.3	$3k$

Find

- k
 - $P(-2 < X < 2)$
- If X is a random variable X is

$$P(x) = \begin{cases} kx & x = 1, 2, 3 \\ 0 & \text{otherwise} \end{cases}$$
 Find k and $E(X)$

- Find mean and variance of one point distribution.

Q.4 Answer any Two of the following.

- Find mean and variance of geometric distribution.
- State and prove additive property of binomial distribution
- State and prove recurrence relation for probability of Poisson distribution.

Q.5 Answer any One of the following questions.

- Given the following probability function of discrete r. v. X

$X:$	0	1	2	3	4	5	6	7
$P(x):$	0	c	$2c$	$2c$	$3c$	c^2	$2c^2$	$7c^2+c$

Find

- c
 - $P(X \geq 5)$
 - Distribution function of X
- Let X be a discrete r.v. having probability distribution

$$P(x) = k \binom{5}{x} \quad x = 0, 1, 2$$

Find

- k
- mean of X
- variance of X

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper – IV)
Developmental Biology of Vertebrates (22221233)

Day & Date: Friday, 17-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagram wherever necessary.

Q.1 Multiple choice Questions.

08

- 1) A single primary spermatocyte in spermatogenesis finally produced _____ numbers of spermatozoa.

a) 2	b) 4
c) 6	d) 8
- 2) The process of formation and development of female gamete is called _____.

a) spermatogenesis	b) menstruation
c) ovulation	d) oogenesis
- 3) In multicellular organisms _____ is the process of programmed cell death.

a) Metastasis	b) Apoptosis
c) Necrosis	d) Sclerosis
- 4) Which of the following factor not consider for increase the risk of miscarriage?

a) Smoking, alcohol	b) Reading a book
c) older than age 35	d) Viral infections
- 5) The process of spermatogenesis is induced by _____.

a) TSH	b) FSH
c) MSH	d) ACTH
- 6) _____ is a diagnostic imaging technique *used to* visualize subcutaneous body structures.

a) ultra myopathy	b) ultrasonography
c) X-ray	d) Tachometer
- 7) During pregnancy _____ playing a key role in nourishing and providing oxygen to the fetus.

a) placenta	b) eustechian cord
c) endometrium	d) myometrium
- 8) Each successive division after formation of zygote is called as _____.

a) polymorphism	b) cleavage
c) ecdysis	d) mutation

Q.2 Answer any FOUR of the following.

08

- 1) Define Apoptosis
- 2) Write significance of gametogenesis
- 3) Define fertilization
- 4) Write functions of placenta
- 5) Write any two applications of ultrasound technique

- Q.3 Write short notes on any TWO of the following. 08**
- 1) Write on radial holoblastic cleavage patterns on cleavage
 - 2) Discuss types of fertilization
 - 3) Write on implantation of human embryo
- Q.4 Answer any TWO of the following. 08**
- 1) Explain oogenesis in mammals
 - 2) What is cellular differentiation? Discuss mechanism of cellular differentiation
 - 3) Explain types of twins in human
- Q.5 Answer any ONE of the following. 08**
- 1) Describe in detail mechanism of fertilization in human.
 - 2) Describe spermatogenesis in mammals.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper – III)
Geometry (22221223)

Day & Date: Saturday, 18-05-2024

Max. Marks: 40

Time: 09:00 AM To 11:00 AM

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

Q.1 Choose correct alternatives**08**

- 1) The polar form of Cartesian equation $x^2 + y^2 = 2ax$ is _____.
 - a) $r = 3a \cos \theta$
 - b) $r = 2a \cos \theta$
 - c) $r = a \sin \theta$
 - d) $r = 2a \sin \theta$
- 2) $r = a$ represent _____.
 - a) Line
 - b) Parabola
 - c) Circle
 - d) Ellipse
- 3) The equation $\theta = 0$ represent _____.
 - a) the initial line
 - b) a Circle
 - c) Ellipse
 - d) Parabola
- 4) The number of arbitrary constant in the equation $ax + by + cz + d = 0$ is _____.
 - a) 4
 - b) 3
 - c) 2
 - d) 1
- 5) Angle between the planes $x + y + z = 1$ and $x - y = z$ is _____.
 - a) 0
 - b) $\frac{\pi}{4}$
 - c) $\frac{\pi}{3}$
 - d) $\frac{\pi}{2}$
- 6) The distance of the plane $2x - 3y + 6z + 14 = 0$ from the origin is _____.
 - a) 2
 - b) 11
 - c) -2
 - d) 13
- 7) The center of the sphere $x^2 + y^2 + z^2 + 6x + 4y + 8z + 25 = 0$ is _____.
 - a) (3, 2, 4)
 - b) (-3, -2, -4)
 - c) (3, -2, 4)
 - d) (-3, 2, 4)
- 8) The radius of sphere $2(x^2 + y^2 + z^2) + 2x - 3y + 2z - 1 = 0$ is _____.
 - a) $\frac{4}{5}$
 - b) $\frac{3}{4}$
 - c) $\frac{5}{4}$
 - d) $\frac{2}{5}$

Q.2 Attempt any Four of the following:**08**

- a) Find the centre and radius of the sphere $x^2 + y^2 + z^2 + 2x - 4y - 6z + 5 = 0$
- b) Write the formula for relation between Direction cosine and Direction Ratio.
- c) Find the equation of sphere whose centre (2, 3, 5) and radius $r = 2$.
- d) Find the polar coordinate whose Cartesian coordinate is (-1, 1)
- e) Find the Cartesian coordinate whose polar coordinate is (-3, 45°)

- Q.3 Attempt any Two of the following.** **08**
- Transform the equation $x^2 + 4xy + y^2 = a^2$ when axes are rotated through an angle $\theta = \pi/4$
 - Find the angle between two planes $2x - y + z = 6$ and $x + y + 2z = 3$
 - Identify the conic $16x^2 - 24xy + 9y^2 - 104x - 172y + 44 = 0$
- Q.4 Attempt any Two of the following.** **08**
- Explain two types of family of spheres, $S + \lambda P = 0, S_1 + \lambda S_2 = 0$
 - Find the equation of plane in intercept form with figure.
 - Find the equation of tangent plane to the sphere $x^2 + y^2 + z^2 - 6x - 4y + 10z + 12 = 0$ at point $(2, -1, -1)$
- Q.5 Attempt any One of the following.** **08**
- If the axes are rotated through an angle θ , the equation $ax^2 + 2hxy + by^2$ transform into $a'x'^2 + b'y'^2$ then $\theta = \frac{1}{2} \tan^{-1} \left(\frac{2h}{a-b} \right)$
 - Find the condition of tangency the given plane touches to the given sphere. Also show that the plane $2x - 2y + z = -16$ touches to the sphere $x^2 + y^2 + z^2 + 2x - 4y + 2z - 3 = 0$

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
BOTANY (Paper – III)
Plant Ecology (22221202)

Day & Date: Saturday, 18-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Multiple Choice Questions.

08

- 1) _____ are the shade loving plants.

a) Lithophytes	b) Saprophytes
c) Heliophytes	d) Sciophytes
- 2) A plants grows in desert is called _____.

a) xerophytes	b) hydrophytes
c) mesophytes	d) nanophytes
- 3) Floristic composition is _____ character of plant community.

a) quantitative	b) qualitative
c) a & b	d) None of these
- 4) _____ are the producers of ecosystem.

a) Plants	b) Animals
c) Birds	d) Microbes
- 5) Food chain is always starts from _____.

a) decomposers	b) producers
c) consumers	d) scavengers
- 6) Multilayered epidermis is characteristic of _____ Plants.

a) hydrophytic	b) mesophytic
c) xerophytic	d) plasmophytic
- 7) _____ is pioneer stage of xerosere.

a) Crustose lichen stage	b) Shrub stage
c) Herb stage	d) Moss stage
- 8) _____ is the ecological interaction between two or more species where each species has a net benefit.

a) Mutualism	b) Commensalism
c) Parasitism	d) All of these

Q.2 Answer any Four of the following.

08

- a) Define ecosystem.
- b) What is adaptation?
- c) Parasitism.
- d) Define plant community.
- e) What are xerophytes?

- Q.3 Write short notes on any Two of the following. 08**
- a) Stratification
 - b) Submerged hydrophytes
 - c) Wind as ecological factor.
- Q.4 Answer any Two of the following. 08**
- a) Pyramids of biomass.
 - b) Xerophytic succession.
 - c) Commensalism
- Q.5 Answer any One of the following. 08**
- a) Explain biotic components of ecosystem.
 - b) Describe quantitative characters of plant community.

8) $\frac{1}{D-a}X = \underline{\hspace{2cm}}$.

a) $e^{-ax} \int X e^{ax} dx$

b) $e^{ax} \int X e^{-ax} dx$

c) $\int e^{ax} X dx$

d) $\int e^{-ax} X dx$

Q.2 Attempt any four of the following.

08

a) Solve: $\frac{d^3y}{dx^3} + y = 0$

b) Solve $\frac{d^2y}{dx^2} + y = \cos 2x$

c) Define linear differential equations of first order and first degree.

d) Solve $\sqrt{1-x^2} dy + \sqrt{1-y^2} dx = 0$

e) Solve the differential equation
 $(x^2 - y)dx + (y^2 - x)dy = 0$, if it is an exact.

Q.3 Attempt any two of the following.

08

a) Show that $(D - \alpha)(D - \beta)y = (D - \beta)(D - \alpha)y$ where $D = \frac{d}{dx}$

b) Define homogeneous differential equation and explain how they can be solved.

c) Solve $(D^2 + D + 1)y = \sin 2x + e^x$

Q.4 Attempt any two of the following.

08

a) With usual notation prove that,
 $\frac{e^{ax}}{f(D)} = \frac{e^{ax}}{f(a)}$, if $f(a) \neq 0$ and hence solve.

$$\frac{d^2y}{dx^2} - 5 \frac{dy}{dx} + 6y = 2 \cdot e^{4x}$$

b) Explain the method of solving linear differential equation of the type
 $\frac{dy}{dx} + Py = Q$, where P and Q are functions of x only and hence solve.

$$(1 + x^2) \frac{dy}{dx} + 2xy = \cos x$$

c) Solve $(D^3 - 3D^2 + 4D - 2)y = e^x + \cos x$

Q.5 Attempt any one of the following.

08

a) Define exact differential equation & state and prove the necessary and sufficient condition for exactness of $Mdx + Ndy = 0$ and hence solve
 $(\sin x \cos y + e^{2x})dx + (\cos x \sin y + \tan y)dy = 0$

b) With usual notations prove that

$$\frac{1}{f(D)}\{e^{ax} \cdot V\} = e^{ax} \cdot \frac{1}{f(D+a)} \cdot \{V\} \text{ and hence solve}$$

$$\frac{d^2y}{dx^2} - 2 \frac{dy}{dx} + y = x^2 \cdot e^{2x}$$

- Q.3 Write Short Notes on Any Two of the following.** **08**
- a) Economic importance of family Solanaceae.
 - b) Binomial nomenclature.
 - c) Importance of botanical gardens.
- Q.4 Answer Any Two of the following.** **08**
- a) Write distinguishing characters of the family Nyctaginaceae.
 - b) Write the principles of ICBN
 - c) Write the merits of Bentham and Hooker's system of classification.
- Q.5 Answer Any One of the following.** **08**
- a) Explain the key features of Lead Botanical Garden.
 - b) Describe Bentham and Hooker's system of classification.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper – III)
Semiconductor Devices (22221226)

Day & Date: Tuesday, 21-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Select the correct alternative

08

- 1) In n-type semiconductor _____ group element is doped in pure semiconductor.
 - a) second
 - b) third
 - c) fourth
 - d) fifth
- 2) In p-type semiconductor _____ are the majority charge carriers.
 - a) protons
 - b) holes
 - c) electrons
 - d) None
- 3) The cut-in voltage of silicon pn junction diode is _____ volt.
 - a) 0
 - b) 0.3
 - c) 0.7
 - d) 1
- 4) In _____ diode the junction capacitance changes with applied reverse voltage.
 - a) zener
 - b) varactor
 - c) tunnel
 - d) photo
- 5) JFET is a _____ controlled device.
 - a) voltage
 - b) current
 - c) power
 - d) None
- 6) SCR has _____ semiconductor layers.
 - a) two
 - b) three
 - c) four
 - d) five
- 7) Triac is a _____ switch.
 - a) Unidirectional
 - b) Bidirectional
 - c) Mechanical
 - d) None
- 8) MOSFET is also known as _____ FET.
 - a) many gate
 - b) open gate
 - c) insulated gate
 - d) shorted gate

Q.2 Answer any Four of the following.

08

- a) What is static and dynamic resistance of diode?
- b) What is intrinsic semiconductor?
- c) Draw the symbols of: a) Tunnel diode, b) Varactor diode, c) Triac, d) UJT.
- d) Define ac drain resistance and amplification factor in JFET.
- e) Draw the construction and symbol of enhancement type MOSFET.

- Q.3 Write short notes on any Two of the following. 08**
- a) Extrinsic semiconductors
 - b) Photodiode
 - c) DIAC
- Q.4 Answer any Two of the following. 08**
- a) Define α and β . Derive relation between them.
 - b) Explain the I-V characteristics of zener diode.
 - c) Explain the construction and working of SCR.
- Q.5 Answer any One of the following. 08**
- a) Explain input and output characteristics of a transistor in CE configuration.
 - b) What is JFET? Explain the construction and working of n-channel JFET.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
PHYSICAL GEOGRAPHY (Paper – III)
Human Geography I (22221235)

Day & Date: Tuesday, 21-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams wherever necessary.
 4) Use of maps stencil is allowed.

Q.1 Choose the correct alternatives from the options.

08

- 1) _____ is known as the father of Human Geography.
 - a) Miss. Semple
 - b) Humboldt
 - c) Ratzel
 - d) Blache
- 2) Secondary activities are called as _____ collar workers.
 - a) Black
 - b) White
 - c) Red
 - d) Blue
- 3) Shiahs and sunnis are the two broad division of _____ religion.
 - a) Buddha
 - b) Islam
 - c) Christian
 - d) Hindu
- 4) Buddha Gaya and Sarnath are the important holy places of _____ religion.
 - a) Hindu
 - b) Christian
 - c) Buddha
 - d) Islam
- 5) Skin of mangolian is _____ Colour.
 - a) Yellow
 - b) Blue
 - c) Black
 - d) Red
- 6) The book 'The Origin of Species is written by _____.
 - a) Ratzel
 - b) Jems Hutton
 - c) W.M.Davis
 - d) Charles Darwin
- 7) The Combine living of boys and girl is known as _____.
 - a) Gotul
 - b) Lonu
 - c) Bada
 - d) Morung
- 8) Dharma, Karma, Moksha and Moral values are plays important role in _____.
 - a) Hindusim
 - b) Christian
 - c) Jaudaism
 - d) Buddha

Q.2 Answer any Four of the following.

08

- a) Physical characteristics of Eskimo.
- b) Write the types of economic activities.
- c) State the types of race on the basis of colour of skin.
- d) State the languages of Indo-European family.
- e) Branches of Human Geography.

- Q.3 Write short notes on any Two of the following. 08**
- a) Explain the region and characteristics of Naga.
 - b) Importance of human geography.
 - c) Economy of Bushmen.
- Q.4 Answer any Two of the following. 08**
- a) Explain Language group in the World.
 - b) Write the characteristics of Jainism.
 - c) Racial Classification.
- Q.5 Answer any One of the following. 08**
- a) Explain the various language families in the world.
 - b) Explain Nature and Scope of human geography.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Paper – III)
Structural Geology (22221214)

Day & Date: Tuesday, 21-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Select correct one

08

- 1) Folds that have parallel limbs are called _____ fold.
 - a) Plunging fold
 - b) Symmetrical fold
 - c) Asymmetrical
 - d) Isoclinal
- 2) _____ separates younger and older rock formations.
 - a) Joints
 - b) Unconformity
 - c) Fold
 - d) Fault
- 3) The true dip is defined as the _____ angle of dip on a rock bed.
 - a) Minimum
 - b) Maximum
 - c) Moderate
 - d) Any
- 4) Exposures of the rocks on the earth surface is called _____.
 - a) Outcrop
 - b) Inlier
 - c) Trench
 - d) Outlier
- 5) The major break in sedimentation is called as _____.
 - a) Fold
 - b) Fault
 - c) Joints
 - d) Unconformity
- 6) The total displacement measured along the fault plane is called _____.
 - a) Heave
 - b) Hade
 - c) Net slip
 - d) Throw
- 7) Up folds of layered rocks are called as _____.
 - a) Anticlines
 - b) Faults
 - c) Synclines
 - d) Unconformities
- 8) Tension joints are seen in _____.
 - a) Mud stone
 - b) Conglomerate
 - c) Sandstone
 - d) Granite

Q.2 Answer any four of the following.

08

- 1) Define fold.
- 2) What is apparent dip?
- 3) Define fault.
- 4) Difference between fault and Joints.
- 5) Define joints
- 6) Define Unconformities.

- Q.3 Write short notes on any two of the following.** **08**
- 1) Use of Clinometer and Brunton compass.
 - 2) Explain horst and Graben.
 - 3) Nomenclature of faults.
- Q.4 Answer any two of the following.** **08**
- 1) Nomenclature of folds.
 - 2) Explain normal and reverse fault.
 - 3) Describe significance of Unconformities.
- Q.5 Answer any one of the following** **08**
- 1) Explain any four types of fold.
 - 2) Explain Geometric classification of Joints.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
Electronics (Paper - IV)
Digital Electronics (22221227)

Day & Date: Wednesday, 22-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Select the correct alternative from the following**08**

- 1) SISO in shift register stands for _____.
 a) shift in shift out b) shift in serial out
 c) serial in shift out d) serial in serial out
- 2) RS flip flop output remains same when _____.
 a) R=0 S=0 b) R=1 S=1
 c) R=0 S=1 d) R=1 S=0
- 3) IC 7476 is a _____ flip flop.
 a) D b) JK
 c) RS d) decoder
- 4) Series counter is also called as _____ counter.
 a) synchronous b) asynchronous
 c) ring d) johnsons
- 5) Multiplexer is device which has _____.
 a) many inputs one output b) one input many output
 c) many inputs many outputs d) none of these
- 6) A circulating shift register is also known as _____.
 a) Decade counter b) Ring counter
 c) Johnson's counter d) None of these
- 7) TTL stands for _____.
 a) Transistor Transistor Logic
 b) Transistor Transformer Logic
 c) Transformer Transformer Logic
 d) Transformer Transistor Logic
- 8) _____ is priority encoder.
 a) IC 7447 b) IC 74147
 c) IC 7490 d) IC 7495

Q.2 Answer any four of the following.**08**

- a) What is truth table? Give truth table of Master slave JK flipflop.
- b) What is combination of counter?
- c) What is demultiplexer?
- d) Define fan in and fan out for TTL NAND gate.
- e) Draw the timing diagram of left shift register with input 1000.

- Q.3 Write short notes on any two of the following** **08**
- a) 1:4 demultiplexer
 - b) Explain MOD 5 counter
 - c) TTL NAND gate
- Q.4 Answer any Two of the following.** **08**
- a) Define the term 1) Noise margin 2) Propagation delay time 3) Power dissipation 4) sourcing current
 - b) What is flip flop? What are its types? Explain RS flip flop using NAND gate.
 - c) Explain Common anode seven segment display along with decoder driver.
- Q.5 Answer any one of the following** **08**
- a) Explain 4-bit binary Johnsons counter with its truth table and timing diagram.
 - b) Explain construction and working of decade counter using IC 7490 with its necessary truth table and timing diagram.

- Q.3 Write short notes any Two of following. 08**
- a) Low density population region of the world.
 - b) Age and Sex Ratio.
 - c) Characteristics of Plantation Agriculture.
- Q.4 Answers any Two of the following. 08**
- a) Explain any four functions of urban settlement.
 - b) Merits of demographic transition theory.
 - c) Explain the physical problems of Indian Agriculture.
- Q.5 Answers any One of the following. 08**
- a) Explain the economic factors affecting on population distribution of the world.
 - b) Explain the pattern of rural settlement.

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B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Paper – IV)
Crystallography (22221215)

Day & Date: Wednesday, 22-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

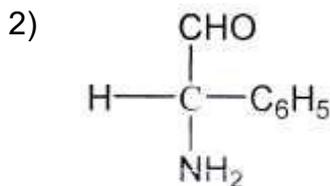
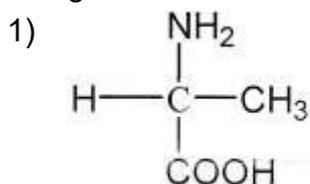
- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks

Q.1 Choose the correct answer from the given option**08**

- 1) Imaginary Plane/surface which divides a crystal in to two equal parts is called _____.
 - a) Axis of symmetry
 - b) Centre of symmetry
 - c) Plane of symmetry
 - d) All the above
- 2) Gypsum, augite, hornblende, orthoclase minerals crystallize in _____ system.
 - a) Monoclinic
 - b) T Hexagonal
 - c) Cubic
 - d) Triclinic
- 3) In hexagonal system, all three horizontal axes make _____ angle with each other.
 - a) 180°
 - b) 120°
 - c) 90°
 - d) 60°
- 4) Study of crystals with their origin, symmetry, occurrence and characters is called as _____.
 - a) Mineralogy
 - b) Petrology
 - c) Cryptography
 - d) Crystallography
- 5) Orthorhombic system has _____ mineral type.
 - a) baryte
 - b) gypsum
 - c) beryl
 - d) galena
- 6) Cubic crystal system shows _____ crystallographic axes.
 - a) 1
 - b) 3
 - c) 4
 - d) 2
- 7) Normal prism has _____ indices.
 - a) (111)
 - b) (101)
 - c) (110)
 - d) (001)
- 8) Basal pinacoid cuts _____ axis.
 - a) vertical
 - b) horizontal
 - c) inclined
 - d) All the above

- Q.2 Answer any Four of the following. 08**
- a) Define crystal
 - b) What is plane of symmetry?
 - c) What are crystallographic axes?
 - d) What is interfacial angle?
 - e) Basal pinacoid in tetragonal system.
 - f) Symmetry element of beryl type.
- Q.3 Write Short notes on any Two of the following. 08**
- a) Prism and pyramid in tetragonal system.
 - b) Index system of miller.
 - c) Tetragonal System.
- Q.4 Answers any Two of the following. 08**
- a) Explain hexagonal crystal system with beryl type class.
 - b) Explain rhombohedron.
 - c) Macrodomes and brachydomes.
- Q.5 Answers any One of the following. 08**
- a) Describe the isometric system with galena type class.
 - b) Describe the monoclinic crystal system.

b) Assign the 'R' and 'S' configuration to the following.



c) What is the action of following on ethylene glycol?

- 1) Lead tetra acetate
- 2) Periodic acid

d) Give the general mechanism of nucleophilic addition to carbonyl compound.

e) What is the action of following on ethylene oxide?

- 1) $\text{C}_2\text{H}_5\text{MgBr}/\text{H}_2\text{O}, \text{H}^+$
- 2) $\text{H}_2\text{O}/\text{H}^+$

Q.3 Write short notes on any Two of the following.

08

a) Exactly 2.63×10^{-5} kg of an organic compound having the formula $\text{C}_7\text{H}_9\text{NO}$ is subjected to Zeisel's method and the methyl iodide released precipitated 5.025×10^{-5} kg of AgI. Calculate percentage and number of methoxy groups per molecule.

b) How will you prepare succinic acid from a) ethylene bromide and maleic acid? What happens when it reacts with.

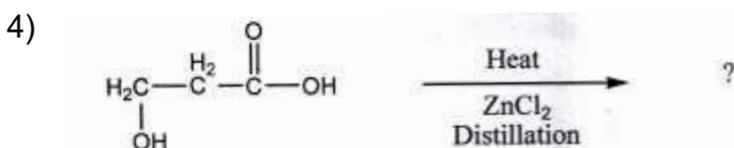
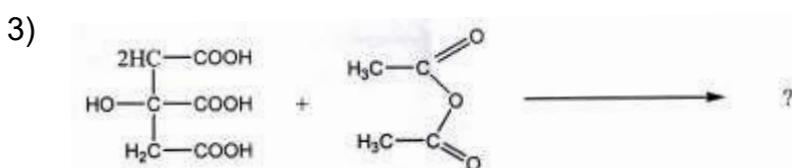
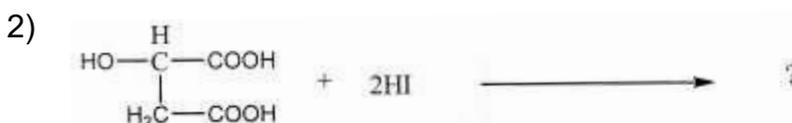
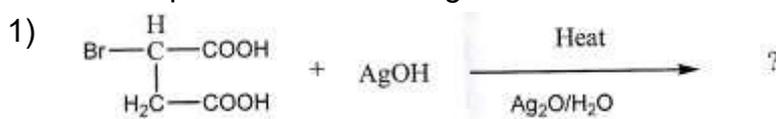
- 1) Action of heat
- 2) Action of NaHCO_3

c) Discuss in details the effect of conjugation on the position of UV bands in dienes.

Q.4 Answer any Two of the following.

08

a) Predict the products of following:



b) Define the terms with example:

- 1) Bathochromic shift
- 2) Hypsochromic shift
- 3) Hyperchromic shift
- 4) Hypochromic shift

c) Explain in detail Benzoin condensation reaction with mechanism.

Q.5 Answer any One of the following.

- a) What is meant by conformational isomerism? Discuss conformational isomers in n-butane. Draw the various conformers.
- b) Explain Reimer-Tiemann reaction with mechanism? What is the action of following reagents on Phenol:
- 1) HCN and HCl in presence of anhydrous AlCl_3
 - 2) Allyl bromide in presence of aq. NaOH
 - 3) Acetyl chloride in the presence of acid

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper – V)
Data Structure (22221320)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:**
- 1) All questions are compulsory.
 - 2) Figures to the right indicate full marks.
 - 3) Use of log tables and calculators allowed.
 - 4) Draw a neat labelled diagram wherever necessary.

Q.1 Choose the correct alternative.

08

- 1) The Data structure used in standard implementation of Breadth First Search is?
 - a) Stack
 - b) Queue
 - c) Linked List
 - d) Tree
- 2) Which among the below specified condition is applicable if the Queue is non _____ empty?
 - a) rear > front
 - b) rear < front
 - c) rear = front
 - d) Unpredictable
- 3) Identify the data structure which allows deletions at both ends of the list but insertion at only one end.
 - a) Input-restricted deque
 - b) Output-restricted deque
 - c) Priority queues
 - d) None of above
- 4) Which of the following algorithms are used to find the shortest path from a source node to all other nodes in a weighted graph?
 - a) BFS
 - b) Dijkstra's Algorithm
 - c) Prim's Algorithm
 - d) Kruskal's Algorithm
- 5) What is the best case for linear search?
 - a) $O(n \log n)$
 - b) $O(\log n)$
 - c) $O(n)$
 - d) $O(1)$
- 6) Which one of the following data structures are preferred in database system implementation?
 - a) AVL tree
 - b) B-tree
 - c) B+ -tree
 - d) Splay tree
- 7) While evaluating a prefix expression, the string is read from?
 - a) left to right
 - b) right to left
 - c) center to right
 - d) center to left to right
- 8) The complexity of merge sort algorithm is _____.
 - a) $O(n)$
 - b) $O(\log n)$
 - c) $O(n^2)$
 - d) $O(n \log n)$

- Q.2 Answer any Four of the following. 08**
- a) List out the advantages of using linked list.
 - b) Define abstract data type.
 - c) State the difference between stack and queue.
 - d) Define priority queue.
 - e) Define complete binary tree.
 - f) What do you mean by breadth first search.
- Q.3 Write short notes of any Two of the following. 08**
- a) Explain adjacency list with example.
 - b) Explain circular queue in detail.
 - c) Explain singly linked list with create operation.
- Q.4 Answer any Two of the following. 08**
- a) Write an algorithm to convert infix expression to postfix expression with example.
 - b) Write a program to implement merge sort.
 - c) Write a program to create binary search tree.
- Q.5 Answer any One of the following. 08**
- a) Write a program to implement Linear search.
 - b) Evaluate the following Postfix Expression by using an algorithm.
4, 10, 5, +, *, 15, 3, /, -

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Paper-VI)
Inorganic Chemistry (22221331)

Day & Date: Thursday, 25-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagram and give equations wherever necessary.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts: H=1, C=12, O=16, Na=23, Cl=35.5)

Q.1 Choose the correct alternatives from the options.

08

- 1) _____ is the first transition element.

a) Ti	b) Fe
c) Sc	d) Ni
- 2) Manganese achieve the highest oxidation state in its _____ compound.

a) MnO ₂	b) Mn ₃ O ₄
c) K ₂ MnO ₄	d) KMnO ₄
- 3) The EAN of Fe in K₄ [Fe(CN)₆] is _____.

a) 35	b) 36
c) 37	d) 34
- 4) VBT was applied to complexes by _____.

a) Sidwick	b) Werner
c) L. Pauling	d) S. M. Jorjensun
- 5) The interaction of hard acid with hard base can form _____ bond.

a) coordinate covalent	b) ionic
c) covalent	d) nonpolar
- 6) _____ is most stable compound.

a) AgF ₂ ⁻	b) AgCl ₂ ⁻
c) AgI ₂ ⁻	d) AgBr ₂ ⁻
- 7) EDTA is _____ dentate chelating agent.

a) hexa	b) bi
c) tri	d) tetra
- 8) The chelating agent must have atleast _____ donor groups.

a) three	b) two
c) one	d) zero

- Q.2 Answers any four of the following.** **08**
- a) Define -
 - i) Geometrical isomerism
 - ii) Optical isomerism
 - b) Define degeneracy.
 - c) State the Pearson's principle
 - d) What is symbiosis?
 - e) Define the terms
 - i) Chelating agent
 - ii) Complexing agent
- Q.3 Answers any two of the following.** **08**
- a) Distinguish between double salt & complex salt
 - b) Why transition elements show colour?
 - c) Explain the structural requirements for chelate formation.
- Q.4 Answers any two of the following.** **08**
- a) On the basis of VBT, Explain the formation of $[\text{NiCl}_4]^{2-}$ complex ion.
 - b) Explain the magnetic behaviour of transition elements.
 - c) Define Lewis acids and bases. Give their types with suitable examples.
- Q.5 Answers any one of the following.** **08**
- a) Explain Werner's theory applied to cobalt amine complexes.
 - b) What are transition elements? Give name, atomic symbol and electronic configuration of 3d transition elements.

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper-VI)
Software Engineering (22221321)

Day & Date: Thursday, 25-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

Q.1 Choose the correct alternative.

08

- 1) Which of the following life cycle model can be chosen if the development team has less experience on similar projects?
 - a) Spiral
 - b) Waterfall
 - c) RAD
 - d) Iterative Enhancement Model
- 2) What is Software?
 - a) Software is set of programs
 - b) Software is documentation and configuration of data
 - c) Software is set of programs, documentation & configuration of data
 - d) None of the mentioned
- 3) The longest method of conversion is _____.
 - a) Direct
 - b) Parallel
 - c) Pilot
 - d) Phased
- 4) If software can run in different environments then it is _____.
 - a) Reliable
 - b) User-friendly
 - c) Portable
 - d) Visible
- 5) Which of the following is/are White box technique?
 - a) Statement Testing
 - b) Decision Testing
 - c) Condition Coverage
 - d) All of the mentioned
- 6) Problem identification is done during _____ phase.
 - a) System design
 - b) System analysis
 - c) System testing
 - d) All of the above
- 7) Which of the following is not a fact-finding technique?
 - a) Interview
 - b) Record review
 - c) Third party enquiry
 - d) Questionnaire
- 8) HIPO Charts basically shows?
 - a) Which are the input modules?
 - b) How the processing is done?
 - c) Which are the output modules?
 - d) All of the above

- Q.2 Answer any four of the following. 08**
- a) What are the types of decision table?
 - b) What is CLD?
 - c) Define Deterministic and Probabilistic system.
 - d) What is Data Dictionary?
 - e) What is Software Testing?
 - f) Define the term:
 - i) Entity
 - ii) Attribute
- Q.3 Write short notes on any two of the following. 08**
- a) Explain prototyping model.
 - b) What is system maintenance? State the importance of maintenance.
 - c) What is structure chart? How is it better than flowchart?
- Q.4 Answer any Two of the following. 08**
- a) Who is system analyst? Explain the various roles played by the system analyst.
 - b) State the advantages and disadvantages of HIPO.
 - c) Explain the various elements of the system.
- Q.5 Answer any one of the following. 08**
- a) Explain top-down incremental implementation. State its advantages and disadvantages.
 - b) Draw a CLD and First Level DFD for College Admission System.

- Q.2 Answer any four of the following. 08**
- a) What is Precession?
 - b) What is cantilever?
 - c) Define Bending moment.
 - d) What are the applications of Oswald's viscometer?
 - e) What is scalar triple product?
- Q.3 Write short notes on any two of the following. 08**
- a) Explain vector triple product.
 - b) Write a note on Gyroscope.
 - c) What are the factors affecting acoustics?
- Q.4 Answer any Two of the following. 08**
- a) Explain the Searl's viscometer method of determining the coefficient of viscosity.
 - b) Explain Sabine's experimental work and obtain expression for reverberation time.
 - c) Derive the expression of Modulus of rigidity of wire by Searl's method.
- Q.5 Answer any one of the following. 08**
- a) Obtain an expression for time period of Gyrostatic Pendulum.
 - b) Define divergence of vector field and give physical significance of divergence of vector.

- Q.3 Write short notes on any two of the following.** **08**
- a) Write the classification with two examples of simple lipid and compound lipid.
 - b) Explain the importance of erythrose and erythrulose.
 - c) Write note on complex proteins & derived proteins.
- Q.4 Answer any two of the following.** **08**
- a) Write the reactions of monosaccharides.
 - b) Explain pl and ninhydrin reaction.
 - c) Define lipids. Write structure and functions of carotenes.
- Q.5 Answer any one of the following.** **08**
- a) Write the structure, biochemical role and deficiency disorder of pyridoxin.
 - b) What are nucleosides & nucleotides? Explain Watson-Crick model of DNA.

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**B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
PLANT PROTECTION (Paper-V)**

Major crops and methods of integrated plant protection (22221312)

Day & Date: Friday, 26-04-2024

Max. Marks: 40

Time: 03:00 PM To 05:00 PM

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions:

08

- 1) Soyabean crop is taken in _____ season.
 - a) Rabbi
 - b) Kharip
 - c) Summer
 - d) None of these
- 2) Jowar belongs to family _____.
 - a) Graminae
 - b) solanaceae
 - c) liliaceae
 - d) Rutaceae
- 3) Botanical name of tur is _____.
 - a) *Cicer sp.*
 - b) *Cajanus cajan*
 - c) *Helianthus annus*
 - d) *Najanus naja*
- 4) Sugarcane belongs to family _____.
 - a) Malvaceae
 - b) Mimosaceae
 - c) Solanaceae
 - d) Graminae
- 5) Grape berries are used for preparing _____.
 - a) Asawa
 - b) Kishmish
 - c) Kadha
 - d) Churna
- 6) Chemicals are used to check nematodes are known as _____.
 - a) Nematicides
 - b) Fungicides
 - c) Bactericides
 - d) Insecticides
- 7) Bordeaux mixture is used to kill _____.
 - a) Bryophytes
 - b) Pteridophytes
 - c) Fungi
 - d) Algae
- 8) VAM is used as _____.
 - a) Colouring agent
 - b) Bacterial culture
 - c) Fungal biofertilizer
 - d) sand

Q.2 Answer any four of the following.

08

- a) Definition Biofertilizer.
- b) Why need of crop rotation?
- c) What is shaking?
- d) What are Nematicides?
- e) What is field sanitation?
- f) Explain in brief need of plant quarantine in India.

- Q.3 Write short notes on any two of the following. 08**
- a) Role of organic farming in agriculture.
 - b) Bactericides.
 - c) Resistant varieties.
- Q.4 Answer any two of the following. 08**
- a) Write on tin bands & light traps.
 - b) Describe in brief physical methods of plant protection.
 - c) Write in brief account & uses of nematicides.
- Q.5 Answer any one of the following 08**
- a) Give the crop identification, soil type, tillage, seed rate & spacing, intercultural operation, fertilizers, irrigation, intercropping, yield & economic importance of sugarcane.
 - b) Give the crop identification, soil type, tillage, seed rate & spacing, intercultural operation, fertilizers, irrigation, intercropping, yield & economic importance of soyabean.

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
PHYSICS (Paper – VI)
Electronic Devices and Applications (22221305)

Day & Date: Saturday, 27-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of calculator or log table is allowed.
 4) Draw neat labeled diagrams wherever necessary.

Q.1 Multiple choice questions

08

- 1) A differential amplifier amplifies the difference between _____.
 a) input and output signals b) two input signals
 c) two supply voltage d) input signal and supply voltage
- 2) A positive voltage feedback circuit introduces _____ phase shift.
 a) 0° b) 90°
 c) 180° d) 270°
- 3) In differential amplifier, $V_1 = 9$ volt, $V_2 = 3$ volt and $V_0 = 24$ volt, what is the gain of differential amplifier?
 a) 6 b) 15
 c) 4 d) 5
- 4) The value of feedback factor is _____ for passive device.
 a) less than unity b) greater than unity
 c) equal to unity d) equal to zero
- 5) High order of frequency stability is for a _____.
 a) Crystal oscillator b) Colpitts's oscillator
 c) Hartley oscillator d) Phase shift oscillator
- 6) In a p-channel FET, the charge carriers are _____.
 a) electron b) holes
 c) both electron and holes d) none of these
- 7) In the toggle mode of JK flip-flop, both J and K input must be _____.
 a) Low b) High
 c) compliments of each other d) none of these
- 8) A CRO is used to measure _____.
 a) voltage b) frequency
 c) Phase d) All of these

- Q.2 Answer any four of the following.** **08**
- a) Give the comparison between normal amplifier and differential amplifier.
 - b) State the Barkhausen criterion for sustained oscillator.
 - c) Write any two uses of CRO in detail.
 - d) Draw a logical circuit diagram of Half adder.
 - e) UJT has $\eta = 0.6$ and $R_{BB} 10K\Omega$, then calculate the value of R_{B1} .
- Q.3 Write short notes on any two of the following.** **08**
- a) Write a short note on Phase shift oscillator.
 - b) Write a short note on UJT as a voltage sweep generator.
 - c) Explain the operation of transistor series voltage regulator with neat circuit diagram.
- Q.4 Answer any Two of the following.** **08**
- a) Find the frequency of oscillation produced by Colpitts's oscillator, if $C_1 = C_2 = 0.001\mu F$ and $L = 1mH$
 - b) Describe the construction and working of J-K flip-flop.
 - c) What is feedback? Explain the concept of positive feedback and negative feedback.
- Q.5 Answer any one of the following.** **08**
- a) Explain transistor RC coupled amplifier with advantage and disadvantage.
 - b) Draw the Block diagram of CRO and explain the function of each block.

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
BIO-CHEMISTRY (Paper-II)
Biochemical Techniques (22221307)

Day & Date: Saturday, 27-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions:

08

- 1) _____ is not a benefit of BLAST.

a) Speed	b) Statistical rigor
c) Handling of gaps	d) More sensitive
- 2) Chromatography is a physical method that is used to separate and analyse _____.

a) Simple mixtures	b) Metals
c) Viscous mixtures	d) Complex mixtures
- 3) Agarose is a _____ derivative of agar.

a) Monosaccharide	b) disaccharide
c) trisaccharide	d) polysaccharide
- 4) Number of milligrams of KOH required to neutralize fatty acid present in 1 mg of fat is called as _____.

a) Potassium number	b) Iodine number
c) Acid number	d) Saponification number
- 5) Thin Layer Chromatology is the type of _____ chromatography.

a) Partition	b) Adsorption
c) Gas	d) column
- 6) Cholesterol is produced by _____ organ.

a) Kidney	b) Liver
c) Pancreas	d) intestine
- 7) In electrophoresis, DNA will migrate towards _____.

a) Cathode or positive	b) Anode or negative
c) Cathode or negative	d) Anode or positive electrode
- 8) Bioinformatics database is first created by scientist _____.

a) Pearson	b) Dayhoff
c) Richard Durbin	d) Michel J. Dunn

Q.2 Answer any four of the following.

08

- a) How gel plates are prepared?
- b) What are the characteristics of primer used in PCR?
- c) Write two factors affecting electrophoretic mobility.
- d) Which are the data retrieval tools?
- e) Write the meaning of transmittance and absorbance.

- Q.3 Write short notes on any two of the following.** **08**
- a) Write important applications & advantages of thin layer chromatography.
 - b) Explain acid value and saponification value for lipids.
 - c) Write note on Agarose gel electrophoresis.
- Q.4 Answer any Two of the following.** **08**
- a) Write note on Bradford assay and Lowery's assay.
 - b) Explain principle and technique of gel permeating chromatography.
 - c) Write note on applications of Bioinformatics.
- Q.5 Answer any one of the following.** **08**
- a) What is molar and specific absorbance? Write differences between photoelectric colorimeter and spectrophotometer.
 - b) What is blotting technique? Explain in detail southern blotting technique.

- Q.3 Write short notes on any two of the following** **08**
- a) Symptoms of Rust of Ground nut
 - b) Methods of plant pathogen
 - c) Kotch's Postulates
- Q.4 Answer any TWO of the following.** **08**
- a) Write mechanism of plant infection.
 - b) Write about Citrus canker.
 - c) Write classification of plant diseases on the basis of Symptoms.
- Q.5 Answer any ONE of the following.** **08**
- a) Define Disease. Write control measures of plant disease.
 - b) Describe in details about Grain smut of jawar.

- 7) Two random variables X and Y are independently distributed if _____.
 a) Their joint density is equal to the product of their marginal densities
 b) $E(XY) = E(X).E(Y)$
 c) $f(X|Y = y) = f(x)$ and $f(Y|X = x) = f(y)$
 d) all the above
- 8) If $F_x(x)$ is the cumulative distribution function of a continuous r.v. X , then it is _____.
 a) Decreasing function of X b) Non-increasing function of X
 c) Non-decreasing function of X d) none of these

Q.2 Answer any four of the following.

08

- a) Define marginal probability distribution of X given $Y = y$.
 b) Define conditional variance of X given $Y = y$, in case of two-dimensional discrete random variable (X, Y) .
 c) Define m.g.f. of continuous random variable X .
 d) Define Marginal density function of Y .
 e) Define correlation coefficient between X and Y , in case of two dimensional continuous random variable (X, Y)

Q.3 Write short note on any two of the following.

08

- a) Define probability generating function. Show that the p.g.f. of sum of two independent random variable is equal to product of their p.g.f.
 b) The p.d.f. of the continuous v. X is given by

$$f(x) = \begin{cases} x & ; 0 < x < 1 \\ 2 - x & ; 1 < x < 2 \\ 0 & ; \text{otherwise} \end{cases}$$

 Find mean and variance of X .
 c) The joint probability mass function (pmf) of two discrete random variable X and Y is given as

	Y	0	1	2
X				
0		0.1	0.1	0.1
2		0.15	0.2	0.15
4		0.1	0.1	0

Obtain the marginal pmf of X . Compute the mean of X

Q.4 Answer any two of the following.

08

- a) For two dimensional discrete random variables (X, Y) , state and prove multiplication theorem of expectation.
 b) A continuous random variable X has p.d.f.

$$f(x) = \begin{cases} c(3x^2 + 2x) & , 1 \leq x \leq 5 \\ 0 & , \text{otherwise} \end{cases}$$

If $Y = 3X + 2$ Find $E(Y)$

- c) Let (X, Y) is a bivariate continuous random variable with joint p.d.f. $f(x, y)$, then prove that

$$V(aX + bY) = a^2V(X) + b^2V(Y) + 2ab Cov(X, Y)$$

Q.5 Answer any One of the following.

a) A continuous random variable has the p.d.f.

$$f(x) = \begin{cases} kx^2(1-x) & ; 0 < x < 1 \\ 0 & ; \text{otherwise} \end{cases}$$

Find

- 1) The value of k
- 2) $E(X)$
- 3) $V(3 - 4X)$

b) Let X and Y have joint probability density function

$$f(x, y) = \begin{cases} 1 & ; 0 < y < 2x < 2 \\ 0 & ; \text{otherwise} \end{cases}$$

Find

- 1) $E(X/Y = y)$
- 2) $V(X/Y = y)$

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**B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
METEOROLOGY (Paper – I)
Climatology (22221326)**

Day & Date: Monday, 29-04-2024
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions.

08

- 1) Normal lapse rate in the atmosphere is _____^o C per 1000 m.
 - a) 5.6
 - b) 7.5
 - c) 6.5
 - d) 4.6
- 2) Isotherm are the lines joining places of equal _____.
 - a) salinity
 - b) pressure
 - c) rainfall
 - d) temperature
- 3) Climatology is compounded by _____ word.
 - a) Arab
 - b) Greek
 - c) Roman
 - d) French
- 4) An _____ is an immense body of air.
 - a) front
 - b) air mass
 - c) frontolysis
 - d) humidity
- 5) _____ is the science which studies the atmosphere.
 - a) Hydrology
 - b) Climatology
 - c) Pedology
 - d) Phytology
- 6) There are _____ major source region of air masses.
 - a) 6
 - b) 4
 - c) 10
 - d) 8
- 7) Carbon dioxide occupies _____% gaseous in the atmosphere.
 - a) 0.09
 - b) 0.004
 - c) 21
 - d) 0.03
- 8) Monsoon is the wind system of the _____ region.
 - a) tropical
 - b) polar
 - c) sub-polar
 - d) sub-tropical

Q.2 Answer any Four the following.

08

- a) Regional climatology.
- b) Define meteorology.
- c) What is mean by climate?
- d) Elements of weather.
- e) Define monsoon.
- f) Types of humidity.

- Q.3 Write short note on any Two of the following.** **08**
- a) Explain scope and content of climatology.
 - b) Describe the planetary wind systems.
 - c) Continental air mass.
- Q.4 Attempt any Two of the following.** **08**
- a) Explain general circulation in northern hemisphere.
 - b) Explain climatology and its branches.
 - c) Composition of atmosphere.
- Q.5 Attempt any One of the following.** **08**
- a) Give an account of Structure of atmosphere.
 - b) Explain in brief the modification of air masses.

Seat
No.

B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
GEO-CHEMISTRY (Paper – I)
Introduction to Geochemistry (22221328)

Day & Date: Monday, 29-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.

Q.1 Multiple choice questions.**08**

- 1) In case of one component systems, curves shows _____ system.
 - a) univariant
 - b) bivariant
 - c) invariant
 - d) trivariant
- 2) The IUPAC name of C_5H_{10} is _____.
 - a) pentane
 - b) pentene
 - c) pentyne
 - d) pentanol
- 3) _____ is the example of electropositive colloid.
 - a) Gold
 - b) Lead
 - c) Silver
 - d) Platinum
- 4) Phase rule was first discovered by _____.
 - a) Nerst
 - b) Le Chatclier
 - c) Arrenius
 - d) Gibb's
- 5) Co-ordination number of NaCl crystal is _____.
 - a) 6
 - b) 8
 - c) 2
 - d) 4
- 6) Generally the dotted lines in phase diagram represent _____ equilibria.
 - a) stable
 - b) true
 - c) metastable
 - d) both (a) and (b)
- 7) The phase rule is expressed as _____.
 - a) $F = C - P + 2$
 - b) $F + C = P + 2$
 - c) $F - P + C + 2$
 - d) $F + C = P + 1$
- 8) Crystal lattice has a _____ arrangement.
 - a) one-dimensional
 - b) two-dimensional
 - c) three-dimensional
 - d) four-dimensional

Q.2 Answer any Four the following.**08**

- a) What is clay mineral?
- b) Write two examples of aromatic compounds.
- c) Define radius ratio.
- d) Define molecular formula.
- e) What is aliphatic compound? Write one example.

- Q.3 Write short note on any Two of the following. 08**
- a) Explain Goldschmidt's mineralogical phase rule.
 - b) The quantitative analysis of an organic compound gave the following results- C = 9.98%. H = 0.84%, Cl = 89.18% Calculate its empirical formula.
 - c) Explain sulphur system for phase rule in detail.
- Q.4 Answer any Two of the following. 08**
- a) Write homologues series of alkynes up to eight carbon atoms. Write structures of ethyne and 2-butyne.
 - b) Write two electrical and two mechanical properties of colloids.
 - c) Explain structure of Cesium Chloride.
- Q.5 Answer any One of the following. 08**
- a) Write note on geological evidences of clay minerals. Explain silica as chemical sediment.
 - b) Write note on lattice energy of crystals. Explain structure of Sodium Chloride.

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**B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper – V)
Cell Biology (22221322)**

Day & Date: Monday, 29-04-2024
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of log table & calculator is allowed.

Q.1 Multiple choice questions.

08

- 1) The plasma membrane made up of _____.
a) phospholipid bilayer b) protein
c) carbohydrate d) None of these
- 2) The outermost layer of cell is _____.
a) protein layer b) plasma membrane
c) lipid layer d) None of these
- 3) The cell Division of Body cells called as _____.
a) cell cycle b) meiosis
c) mitosis d) None of these
- 4) _____ is called as Power House of energy.
a) Mitochondria b) Endoplasmic Reticular
c) Golgi complex d) None of these
- 5) Prokaryote is a _____ called organism.
a) Triple b) Single
c) Double d) None of these
- 6) In Bacterial cell, the Genetic material is stored in _____.
a) Plasma membrane b) Nucleus
c) Nucleoid d) None of these
- 7) _____ is a microorganism that made up of single prokaryotic cell.
a) Bacteria b) Virus
c) Viroid d) None of these
- 8) The suicide bags are called _____.
a) Mitochondria b) Lysosome
c) Virus d) None of these

Q.2 Answer any Four the following.

08

- a) Endoplasmic Reticulum
- b) Structure and Function of mitochondria
- c) Plasma membrane
- d) Lysosome
- e) Microfilaments

- Q.3 Write short note on any Two of the following. 08**
- a) Cell cycle
 - b) Meiosis
 - c) Role of chromatin
- Q.4 Answer any Two of the following. 08**
- a) Types of Chromosomes
 - b) Function of the Nucleus
 - c) Function of plasma membrane
- Q.5 Answer any One of the following. 08**
- a) Describe in detail on Golgi complex.
 - b) What are the cytoskeleton?

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
STATISTICS (Paper – VI)
Statistical Methods - I (22221309)

Day & Date: Tuesday, 30-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations whenever necessary.
 3) Figures to the right indicate full marks.

Q.1 Choose the correct alternatives from the options.

08

- 1) The Corr ($X_{1.3}, X_{2.3}$) is _____.
 - a) r_{12}
 - b) r_{13}
 - c) $r_{12.3}$
 - d) $r_{13.2}$
- 2) Simple random sample can be drawn with the help of _____.
 - a) random number tables
 - b) lottery method
 - c) drawing chits
 - d) all the above
- 3) In India, the child bearing age is _____.
 - a) 20-24 years
 - b) 15-49 years
 - c) 13-48 years
 - d) 20-29 years
- 4) IF N.R.R. < 1 then we interpret that _____.
 - a) increase in population
 - b) reduction in population
 - c) constancy in population
 - d) all the above
- 5) The number of possible samples of size n from a population of N units by using SRSWR is _____.
 - a) N^n
 - b) N^2
 - c) $n!$
 - d) None of these
- 6) The residual $X_{1.2}$ is called as residual of order _____.
 - a) 0
 - b) 1
 - c) 2
 - d) 3
- 7) In trivariate study the correlation between two variables when the third variable held constant is called as _____.
 - a) simple correlation
 - b) partial correlation
 - c) multiple correlation
 - d) multiple regression
- 8) The disadvantage of C.B.R. is _____.
 - a) it ignores age and sex distribution
 - b) it underestimates fertility rate
 - c) it provides very approximate fertility rate
 - d) all the above

- Q.2 Answer the following questions. (Any Four)** **08**
- a) Define A.S.F.R.
 - b) Define Census and sample.
 - c) Define multiple regression.
 - d) Define residual.
 - e) State variance of sample mean in case of SRSWOR.
- Q.3 Write Short Notes (Any Two)** **08**
- a) Define C.B.R. and G.F.R.
 - b) State and prove any two properties of residuals.
 - c) Explain SRSWR and SRSWOR.
- Q.4 Answer the following (Any Two)** **08**
- a) With usual notations prove that,

$$1 - R^2_{1.23} = (1 - r^2_{12})(1 - r^2_{13.2})$$
 - b) Show that probability of selecting a specified unit at any draw is same as it is being selected at first draw.
 - c) Define G.R.R. and N.R.R. and also state limitations of G.R.R.
- Q.5 Answer the following (Any One)** **08**
- a) Define partial correlation coefficient and derive the formula for partial correlation coefficient.
 - b) With usual notations, prove that

$$\text{var}(\bar{y}_n)_{wr} = \frac{N-1}{Nn} S^2$$

- Q.3 Write short notes on any Two of the following.** **08**
- a) Discuss in detail tephigram.
 - b) Discuss geostrophic wind.
 - c) Discuss energy demand.
- Q.4 Answer any Two of the following.** **08**
- a) Explain nature of radiations and its properties.
 - b) Explain non-inertial frame of reference and pseudo forces.
 - c) What is a geo-synchronous satellite?
- Q.5 Answer any One of the following** **08**
- a) Explain the radiation budget of earth and its atmosphere in relation with scattering, reflection, and absorption.
 - b) Discuss role of ozone in troposphere. How is ozone hole formed?

- Q.2 Answer any Four of the following.** **08**
- a) Name the geochemical elements which have the affinity towards sulphides.
 - b) Pallasites and the meso-siderites are types of which meteorites?
 - c) Define carbonaceous chondrite.
 - d) Names the major constituents of Atmosphere.
 - e) Which constituents are responsible for the important temperature controlling mechanism known as the greenhouse effect.
- Q.3 Write short notes on any Two of the following.** **08**
- a) Composition of earth crust.
 - b) Structure and composition of lower mantle.
 - c) Gains and losses of elements in the oceanic water.
- Q.4 Answer any Two of the following** **08**
- a) Explain the primary differentiation of elements.
 - b) Discuss in brief the composition of meteorites and its types.
 - c) Describe in short, the variable constituent of Atmosphere.
- Q.5 Answer any One of the following.** **08**
- a) Describe interior structure of the earth and its whole composition.
 - b) Explain in brief the geochemical classification of elements. Add note on cosmic abundance of elements.

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper – VI)
Principles of Ecology (22221323)

Day & Date: Tuesday, 30-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions: 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions:

08

- 1) _____ are organisms that live on external surface of host.

a) Endoparasite	b) Prey
c) Mimic model	d) Ectoparasites
- 2) The number and variety of organisms found within a specified geographical region is called as _____.

a) diversity	b) biodiversity
c) bio uniformity	d) fecundity
- 3) In an ecosystem carnivorous are _____.

a) producers	b) primary consumers
c) decomposers	d) Tertiary consumers
- 4) _____ is important abiotic factor required for plants in photosynthesis process.

a) Oxygen	b) Sun light
c) Soil	d) Nitrogen
- 5) First step in primary ecological succession is _____.

a) Nudation	b) Migration
c) Ecesis	d) Aggregation
- 6) A _____ is a linear sequence of organisms through which nutrients and energy pass as one organism eats another.

a) food storage	b) ecological niche
c) ecdysis	d) food chain
- 7) _____ is an example of ectoparasite lives on surface of host.

a) Lice	b) Ascaris
c) Tape worm	d) Amoeba
- 8) _____ is the number of deaths in the population over time.

a) Molarity	b) Mortality
c) Natality	d) Fecundity

Q.2 Answer any four of the following.

08

- a) Define term 'Natality'
- b) What is lotic freshwater ecosystem.
- c) What are sacred grooves in India?
- d) Write names of biodiversity hot spots in India.
- e) Define term 'Ecology'.

- Q.3 Write short notes on any two of the following.** **08**
- a) Write on grassland ecosystem.
 - b) Write parental care in fishes.
 - c) Discuss ecological pyramid with one example.
- Q.4 Answer any two of the following.** **08**
- a) Write on desert ecosystem.
 - b) What is species diversity, write importance of biodiversity.
 - c) Discuss in brief, zones of marine ecosystem.
- Q.5 Answer any one of the following** **08**
- a) Discuss in detail effect of abiotic factor temperature on animals life.
 - b) Explain any two interspecific associations with one example.

Q.2 Answer any Four of the following.

- a) Find the length of sub-tangent of the curve $y^2 = 4ax$ at any point.
- b) Find the radius of curvature of the curve $x^2 + y^2 = a^2$ at any point.
- c) Show that the maximum value of $\left(\frac{1}{x}\right)^x$ is $e^{1/e}$.
- d) If $u = 3x + 2y - z$, $v = x - 2y + z$ and $w = x + 2y - z$ the find $\frac{\partial(u,v,w)}{\partial(x,y,z)}$
- e) Find $\frac{ds}{dx}$, for the curve $y = a \cdot \cos h \frac{x}{a}$.

Q.3 Answer any Two of the following.

- a) Find polar sub-tangent and subnormal for $\frac{l}{r} = 1 + e \cos \theta$.
- b) Find radius of curvature for the curve $r = a(1 - \cos \theta)$ at any point.
- c) If z_1, z_2, z_3 are functions of three variables y_1, y_2, y_3 and y_1, y_2, y_3 are functions of x_1, x_2, x_3 then $\frac{\partial(z_1, z_2, z_3)}{\partial(x_1, x_2, x_3)} = \frac{\partial(z_1, z_2, z_3)}{\partial(y_1, y_2, y_3)} \cdot \frac{\partial(y_1, y_2, y_3)}{\partial(x_1, x_2, x_3)}$.

Provided the concerned partial derivative exists.

Q.4 Answer any Two of the following.

- a) If $y = f(x)$ be a equation of curve in cartesian form then show that radius of curvature $\rho = \frac{\left[1 + \left(\frac{dy}{dx}\right)^2\right]^{3/2}}{\frac{d^2y}{dx^2}}$
- b) Show that the functions $u = \frac{x+y}{1-xy}$ and $v = \tan^{-1} x + \tan^{-1} y$ are dependent to each other. Also find the relation between them.
- c) Find the extreme values of the function $u = x^2 + 2xy + 2y^2 + 2x + y$.

Q.5 Answer any One of the following

- a) 1) If $x = f(t)$ and $y = g(t)$ are parametric equation of the curve then show that $\rho = \frac{\{(f^1)^2 + (g^1)^2\}^{3/2}}{f^1 g^{11} - g^1 f^{11}}$
- 2) Find the radius of curvature of the parabola $x = a \pm^2, y = 2a \pm$ at any point.
- b) 1) Explain Lagrange's method of undetermined multiplier to find the extreme values of $u = f(x, y, z)$ subject to the conditions $\phi(x, y, z) = 0$ and $\Psi(x, y, z) = 0$.
- 2) Find the extreme value of $u = xy^2z^3$ subject to the condition $x + y + z = 6$.

- Q.3 Write short notes on any two of the following. 08**
- a) Sclerids
 - b) Function of epidermis.
 - c) Collenchyma
- Q.4 Answer any two of the following. 08**
- a) Explain the significance of Tunica carpus theory.
 - b) Describe the Sclerenchyma studied by you.
 - c) Explain the conjoint vascular bundle.
- Q.5 Answer any one of the following. 08**
- a) Explain the primary structure of monocot stem.
 - b) Describe the structure and function of vascular cambium.

- 7) If $y(x, t)$ is a function of x and t then $L\left\{\frac{\partial^2 y}{\partial t^2}\right\} = \underline{\hspace{2cm}}$.
- a) $p^2\bar{y}(x, p) - py(x, 0) - y_t(x, 0)$ b) $p^2\bar{y}(x, p) + py(x, 0) - y_t(x, 0)$
 c) $p^2\bar{y}(x, p) - py_t(x, 0) - y(x, 0)$ d) $p^2\bar{y}(x, p) + py(x, 0) + y_t(x, 0)$
- 8) If $y(x, t)$ is a function of x and t then $L\left\{\frac{\partial y}{\partial t}\right\} = \underline{\hspace{2cm}}$
- a) $x\bar{y}(x, p) + y(x, 0)$ b) $p\bar{y}(x, 0) - y(x, p)$
 c) $p\bar{y}(x, p) - y(x, 0)$ d) $p\bar{y}(x, p) + y(x, 0)$

Q.2 Attempt any four of the following

08

- a) Find $L\{e^{-3t}t^3\}$
 b) Find $L^{-1}\left\{\frac{1}{\sqrt{p}}\right\}$
 c) Find $L^{-1}\left\{\frac{1}{p^2-6p+10}\right\}$
 d) Find $L\{\cos h^2 2t\}$
 e) If $y(x, t)$ is a function of x and t then prove that $L\left\{\frac{\partial^2 y}{\partial x^2}\right\} = \frac{\partial^2 \bar{y}}{\partial x^2}$

Q.3 Attempt any two of the following

08

- a) If $L\{F(t)\} = f(p)$ then prove that $L\{F(at)\} = \frac{1}{a}f\left(\frac{p}{a}\right)$
 b) If $L^{-1}\{f(p)\} = F(t)$ then prove that $L^{-1}\{f(p-a)\} = e^{at}L^{-1}\{f(p)\}$
 c) Solve $(D^2 - 2D + 2)y = 0$, $y = D_y = 1$, when $t = 0$

Q.4 Attempt any two of the following.

08

- a) Evaluate $L^{-1}\left\{\frac{3p+7}{p^2-2p-3}\right\}$
 b) Find $L\{F(t)\}$, where

$$F(t) = \begin{cases} \sin\left(t - \frac{\pi}{3}\right) & , \quad t > \frac{\pi}{3} \\ 0 & , \quad t < \frac{\pi}{3} \end{cases}$$

 c) Solve $ty'' + y' + 4ty = 0$ if $y(0) = 3, y'(0) = 0$

Q.5 Attempt any one of the following

08

- a) State and prove Convolution theorem for inverse Laplace transform.
 b) Show that
 i) $L\left\{\frac{\cos \sqrt{t}}{\sqrt{t}}\right\} = \sqrt{\frac{\pi}{p}} e^{-\frac{1}{4p}}$
 ii) $\int_0^\infty \frac{F(t)}{t} at = \int_0^\infty f(x) dx$ Provided that the integral converges.

Seat
No.

B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
BOTANY (Paper – VI)
Plant Metabolism (22221303)

Day & Date: Friday, 03-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N= 14, Na =23, Cl = 35.5)

Q.1 Multiple choice questions.**08**

- 1) Which of the following is produced with the combination of apoenzyme and coenzyme:
 - a) Holoenzyme
 - b) Enzyme substrate complex
 - c) Prosthetic group
 - d) Enzyme product complex
- 2) Enzymes are made up of _____.
 - a) Fats
 - b) Proteins
 - c) Nucleic acids
 - d) Vitamins
- 3) Indole-3-acetic acid is the most common naturally occurring plant hormone of _____ class.
 - a) Gibberellin
 - b) Auxin
 - c) Ethylene
 - d) Cytokinin
- 4) _____ is a gaseous plant hormone.
 - a) IBA
 - b) Ethylene
 - c) Abscisic acid
 - d) NAA
- 5) Enzymes are polymers of: _____.
 - a) Hexose sugar
 - b) Amino acids
 - c) Fatty acids
 - d) Inorganic phosphate
- 6) _____ are the elements, without which, the plants will not be able to complete its life cycle.
 - a) Fertilizers
 - b) Microelements
 - c) Macroelements
 - d) Essential elements
- 7) _____ is an important mineral nutrient.
 - a) Hydrogen
 - b) Nitrogen
 - c) Oxygen
 - d) Carbon
- 8) Which of the following is the simplest form of carbohydrates?
 - a) Carboxyl groups
 - b) Aldehyde and Ketone groups
 - c) Alcohol and Carboxyl groups
 - d) Hydroxyl groups and Hydrogen groups

- Q.2 Answer any Four the following.** **08**
- a) Define enzymes.
 - b) What is symbiotic nitrogen fixation?
 - c) Enlist the plant growth regulators.
 - d) Define macronutrients.
 - e) Define Carbohydrate.
- Q.3 Write short note on any Two of the following.** **08**
- a) Describe any four types of enzymes with examples.
 - b) Explain the discovery of gibberellins and with its roles.
 - c) Explain the mechanism of biological nitrogen fixation.
- Q.4 Attempt any Two of the following.** **08**
- a) Explain nitrogen cycle in detail.
 - b) Give the roles of auxin and cytokinin.
 - c) Give the classification of enzyme with examples.
- Q.5 Attempt any One of the following.** **08**
- a) Define macronutrients and enlist the roles of N, P, K.
 - b) Explain mechanism of enzyme action.

Seat
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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper – V)
Electronic Circuits (22221318)

Day & Date: Saturday, 04-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 Choose correct alternative from the given options.**08**

- 1) In case of phase shift oscillator, the expression for frequency of oscillation is _____.
- a) $f = \frac{1}{2\pi RC}$ b) $f = \frac{1}{2\pi\sqrt{6} RC}$
- c) $f = \frac{1}{2\pi\sqrt{RC}}$ d) $f = \frac{1}{2\pi\sqrt{8} RC}$
- 2) Another name for positive feedback is _____.
- a) regenerative b) degenerative
 c) generative d) reductive
- 3) Cross over distortion is observe in _____ amplifier.
- a) Class-A b) Class-C
 c) Class-AB d) Class-B
- 4) The stability factor is defined as $S =$ _____.
- a) $\frac{\Delta I_C}{\Delta I_{CBO}}$ b) $\frac{\Delta I_E}{\Delta I_C}$
 c) $\frac{\Delta I_C}{\Delta I_E}$ d) $\frac{\Delta I_C}{\Delta t}$
- 5) The ripple factor of centre tapped full wave rectifier is _____.
- a) 0.812 b) 0.406
 c) 0.483 d) 1.21
- 6) The TUF of the bridge rectifier is _____.
- a) 32.8 b) 28.7
 c) 69.3 d) 81.2
- 7) The base resistor method is generally used in _____.
- a) Amplifier circuits b) switching circuits
 c) Rectifier circuits d) oscillators
- 8) In case of CE amplifier the phase difference between input and output is _____.
- a) 0° b) 270°
 c) 180° d) 90°

- Q.2 Answer any Four of the following.** **08**
- a) In phase shift oscillator $R = 10\text{ K}\Omega$, $C = 0.1\ \mu\text{F}$. calculate the frequency of oscillations.
 - b) Determine gain of a negative feedback if $A_v = 10$, $\beta = 0.4$
 - c) What is power amplifier? Give its classification.
 - d) Enlist different methods of transistor biasing.
 - e) What is rectification? What are its types?
- Q.3 Write short note on any Two of the following.** **08**
- a) With neat diagram explain working of RC coupled amplifier.
 - b) State any four effects of negative feedback.
 - c) In a Hartley oscillator if $C = 0.01\ \mu\text{F}$, $L_1 = 6\text{ mH}$ and $L_2 = 14\text{ mH}$. Determine feedback fraction, voltage gain, and frequency of oscillation.
- Q.4 Answer any Two of the following.** **08**
- a) Explain the basic action of transistor as an amplifier.
 - b) Explain construction and working of centre tapped full wave rectifier.
 - c) Explain Class-B push pull and complimentary symmetric amplifier.
- Q.5 Answer any One of the following.** **08**
- a) Explain Wein bridge oscillator. Determine frequency of oscillation
If $R = 1.20\text{ K}\Omega$ and $C = 0.1\ \mu\text{F}$
 - b) What is mean by transistor biasing? Explain voltage divider bias. Derive an expression for stability factor.

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**B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
GEOGRAPHY (Paper – V)
Climatology (22221324)**

Day & Date: Saturday, 04-05-2024
Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat diagrams wherever necessary.

Q.1 Choose correct alternative from the given options.

08

- 1) _____ of the following is the lowest atmospheric layer.

a) Stratosphere	b) Exosphere
c) Hydrosphere	d) Troposphere
- 2) _____ is a type of local wind.

a) Trade wind	b) Loo
c) Cyclone	d) Tornado
- 3) Ozone is concentrated in _____ atmospheric layer.

a) Stratosphere	b) Exosphere
c) Hydrosphere	d) Troposphere
- 4) The average albedo of the earth is _____%.

a) 15	b) 25
c) 35	d) 45
- 5) The lines joining the places of equal _____ are called isotherms.

a) Pressure	b) Rainfall
c) Humidity	d) Temperature
- 6) _____ one of the following gases is found in highest quantity in the atmosphere.

a) Helium	b) Hydrogen
c) Oxygen	d) Nitrogen
- 7) Air pressure is lowest in _____ season.

a) Spring	b) Winter
c) Summer	d) Autumn
- 8) _____ Time takes for sun rays to reach earth.

a) 8 minutes	b) 12 minutes
c) 18 minutes	d) 6 minutes

Q.2 Answer any Four of the following.

08

- a) Define the concept of normal lap's rate.
- b) Define the concept of westerlies.
- c) Define the Air Pressure.
- d) Define the concept of Climate.
- e) Define the concept of Insolation.

- Q.3 Write short notes on any Two of the following. 08**
- a) Indian Monsoon
 - b) Precipitation
 - c) Earth pressure belt
- Q.4 Answer any Two of the following. 08**
- a) Explain the composition of the atmosphere.
 - b) Explain the types of humidity.
 - c) Explain the Jet stream.
- Q.5 Answer any One of the following. 08**
- a) Explain the structure of the atmosphere.
 - b) Explain the forces affecting on wind.

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**B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Paper – V)
Mineralogy (22221310)**

Day & Date: Saturday, 04-05-2024
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat and well labeled diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions:

08

- 1) _____ mineral shows cracks in polarized light.

a) Orthoclase	b) Quartz
c) Olivine	d) Calcite
- 2) Chemical composition of Amethyst is _____.

a) SiO ₂	b) CaCO ₃
c) Fe ₂ O ₃	d) None of these
- 3) Relief in minerals under microscope can be expressed as _____.

a) High	b) Moderate
c) Low	d) All of these
- 4) Opal is amorphous variety of _____.

a) Quartz	b) Mica
c) Olivine	d) Garnet
- 5) Which of the following mineral is isotropic in nature?

a) Garnet	b) Biotite
c) Muscovite	d) Olivine
- 6) Cross hatch twinning is shown by _____.

a) Orthoclase	b) Plagioclase
c) Microcline	d) Calcite
- 7) Diamond shows _____ luster.

a) Pearly	b) Adamantine
c) Silky	d) Vitreous
- 8) Actinolite and Tremolite minerals belong to _____ group.

a) Pyroxene	b) Mica
c) Felspathoid	d) Amphibole

Q.2 Answer any Four of the following.

08

- a) Give two names of Mica group minerals.
- b) Define Mineral.
- c) Define Isotropism.
- d) Define Streak of Minerals.
- e) Define Polarized light.

- Q.3 Write short notes on any Two of the following. 08**
- a) Pleochroism with example.
 - b) Physical and Chemical properties of Calcite.
 - c) Twinning in minerals.
- Q.4 Answer any Two of the following. 08**
- a) Explain Olivine mineral.
 - b) Describe types of fractures.
 - c) Explain Lower assembly of Petrological Microscope.
- Q.5 Answer any One of the following. 08**
- a) Describe Physical properties, chemical composition, Occurrence of Pyroxene group minerals.
 - b) Describe Crystallized, Crystalline, crypto-crystalline and Amorphous forms with examples.

- Q.2 Answer any Four of the following. 08**
- a) Define diauxic growth.
 - b) What is chemotaxis?
 - c) Define osmosis.
 - d) Enlist anaerobic organisms.
 - e) What is generation time?
- Q.3 Write short notes on any Two of the following. 08**
- a) Synchronous growth
 - b) Group translocation
 - c) Chlorobium vesicles
- Q.4 Answer any Two of the following. 08**
- a) Components of electron transport chain
 - b) Glyoxylate bypass
 - c) Effect of substrate concentration on enzyme activity.
- Q.5 Answer any One of the following. 08**
- a) Write an essay on classification of enzymes as per IUB.
 - b) Describe in detail sporulation & germination of bacterial endospore.

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper - VI)
Pulse & Switching Circuits (22221319)

Day & Date: Thursday, 09-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.
 4) Use of log-tables and calculator is allowed.
 5) Use of Mobile is strictly prohibited.

Q.1 Multiple choice questions

08

- 1) If the input to a differentiating circuit is a sine-wave, then its output will be _____ wave.

a) cosine	b) square
c) triangular	d) sawtooth
- 2) A clipper circuit is a _____ circuit.

a) Linear wave-shaping	b) non-linear wave-shaping
c) averaging	d) dc level shifter
- 3) Which of these circuits produces a linear sweep?
 - a) UJT sweep circuit with constant current source
 - b) Miller integrator
 - c) Bootstrap generator
 - d) All of these
- 4) When a transistor is used as a switch, it operates in _____.

a) Saturation region	b) cut-off region
c) both a and b	d) active
- 5) If the UTP and LTP of a Schmitt trigger circuit are +5V and +2V respectively, its hysteresis voltage will be _____.

a) 3 volt	b) 3.5 volt
c) 7 volt	d) 10 volt
- 6) The number of inverter gates required to design an astable multivibrator is _____.

a) one	b) two
c) three	d) four
- 7) The lower and upper comparators used in IC555 compare the voltage levels _____ respectively.

a) 0 V and V_{cc}	b) $V_{cc}/4$ and $3V_{cc}/4$
c) $V_{cc}/3$ and $2V_{cc}/3$	d) $V_{cc}/2$ and V_{cc}
- 8) What is the role of pin-5 in IC555?

a) Reset pin	b) trigger pin
c) discharge pin	d) VCO pin

- Q.2 Answer any Four of the following. 08**
- a) Explain in brief the need of wave-shaping circuit.
 - b) List any two features of time-base circuit.
 - c) Give any two switching characteristics of a transistor.
 - d) What is UTP and LTP in Schmitt trigger? Brief in short.
 - e) Significance of figure 555 in IC555.
- Q.3 Write short notes on any Two of the following: 08**
- a) Negative Clamper
 - b) Miller Integrator
 - c) Schmitt-trigger
- Q.4 Answer any Two of the following: 08**
- a) An astable multivibrator using transistors has timing component values $R_1 = 10K\Omega$, $R_2 = 20K\Omega$, $C_1 = 0.1 \mu F$, $C_2 = 0.22 \mu F$. Calculate the duty cycle and frequency of oscillation.
 - b) Operation of IC555 as sequential timer.
 - c) Explain monostable multivibrator using 74121.
- Q.5 Answer any One of the following: 08**
- a) Explain the operation of collector-coupled bistable multivibrator. Draw the timing diagram. Comment on the triggering method used.
 - b) Explain the operation of IC555 as an astable multivibrator. Hence obtain the equation for frequency and Duty-cycle.

- Q.3 Write short notes on any Two of the following.** **08**
- a) Indian Island
 - b) Age Group composition
 - c) Gond Tribe
- Q.4 Answer any Two of the following.** **08**
- a) What is mean by tribe & explain the Bhils tribe?
 - b) Describe the various religious groups in the India.
 - c) Explain the types of soils.
- Q.5 Answer any One of the following.** **08**
- a) Define the mineral resources and explain the Distribution of Iron ore in India.
 - b) Explain the factors affecting distribution of population.

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Paper - VI)
Igneous Petrology (22221311)

Day & Date: Thursday, 09-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Select correct one.

08

- 1) Which of the following is not extrusive igneous rock?
 - a) Basalt
 - b) Andesite
 - c) Obsidian
 - d) Granite
- 2) A glassy texture indicates _____.
 - a) very rapid cooling
 - b) slow cooling
 - c) slow followed by rapid cooling
 - d) none of the above
- 3) Heavy crystals formed during the early phase of crystallization of a magma have a tendency to sink down is called _____.
 - a) fractional crystallization
 - b) gaseous transfer
 - c) liquid immiscibility
 - d) gravity settling
- 4) In continuous Bowen's reaction series _____ is the first mineral to crystallize.
 - a) plagioclase
 - b) biotite
 - c) olivine
 - d) muscovite
- 5) Magmatic gaseous travel towards _____.
 - a) leased pressure
 - b) high pressure
 - c) any direction
 - d) towards core
- 6) In crystallization of binary magma, the melting temperature of liquid _____.
 - a) lowers
 - b) increase
 - c) same
 - d) increase or decrease
- 7) In _____ rock contains 80 to 85% feldspar as essential minerals.
 - a) granite
 - b) basalt
 - c) syenite
 - d) dolerite
- 8) _____ rocks occur as injections within the country rocks.
 - a) plutonic
 - b) hypabyssal
 - c) volcanic
 - d) extrusive

Q.2 Answer any four of the following.

08

- a) Difference between lava and magma.
- b) Define Differentiation.
- c) Essential minerals in Basalt rock.
- d) What is Labile region?
- e) What is hybrid rock?

- Q.3 Write short notes on any two of the following. 08**
- a) Classification of igneous rocks based on mode of occurrence.
 - b) Describe columnar joints.
 - c) Explain any two igneous textures.
- Q.4 Answer any Two of the following. 08**
- a) Formation of Vesicular Structure.
 - b) Explain Bowens continuous reaction series.
 - c) Describe Extrusive igneous rocks.
- Q.5 Answer any one of the following. 08**
- a) Explain crystallization of Unicomponent and Bicomponent magma.
 - b) Explain concordant igneous intrusion in unfolded region.

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B.Sc. (Semester - III) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper - VI)
Fundamentals of Bacterial Genetics (22221315)

Day & Date: Thursday, 09-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

Q.1 Multiple Choice Questions.

08

- 1) Molecular scissor is _____.
 a) restriction endonuclease b) helicase
 c) ligase d) exonuclease
- 2) Introduction of foreign genes for improving genotype is called _____.
 a) vernalization b) tissue culture
 c) biotechnology d) genetic engineering
- 3) Genetic code is _____.
 a) overlapping b) non-overlapping
 c) non universal d) ambiguous
- 4) Nonsense codons are present on _____.
 a) mRNA b) tRNA
 c) rRNA d) None of these
- 5) The RNA molecule that contains thymine is _____.
 a) tRNA b) mRNA
 c) rRNA d) All of the above
- 6) Recombinant DNA technology is also called _____.
 a) biotechnology b) modern biotechnology
 c) genetic engineering d) transgenic technology
- 7) Reverse transcriptase enzyme is required for synthesis of _____.
 a) DNA from RNA b) DNA from DNA
 c) RNA from RNA d) RNA from DNA
- 8) The anticodons are present on _____ molecules.
 a) mRNA b) tRNA
 c) rRNA d) None of these

Q.2 Answer any Four of the following.

08

- a) Explain Codons.
- b) Define Genotype.
- c) What is mutation?
- d) Define Intron and exon.
- e) Define muton and recon.

- Q.3 Write short notes on any Two of the following. 08**
- a) Write a short note on Plasmid.
 - b) Write a short on base pair substitution.
 - c) Describe Griffith experiment.
- Q.4 Answer any Two of the following. 08**
- a) Semiconservative method of DNA replication
 - b) Basic concept of transcription and translation
 - c) Mechanism of Induced mutation
- Q.5 Answer any One of the following. 08**
- a) Describe Genetic code and properties of genetic code.
 - b) Explain in details on replication of DNA.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
CHEMISTRY (Paper – V)
Organic Chemistry (19201305)

Day & Date: Wednesday, 24-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

Q.1 Multiple choice questions.

08

- Ethylene glycol on oxidation with HI_4 gives _____.
 a) Formaldehyde b) Glycolic acid
 c) Oxalic acid d) Glyoxal
- Benzyl alcohol is obtained by _____ reaction.
 a) Aldol b) Cannizzaro
 c) Perkin d) Benzoin
- Williamson's synthesis is used to prepare _____.
 a) Aldehydes b) Ketones
 c) Ethers d) Epoxides
- Ethene on epoxidation with peracetic acid gives _____.
 a) Diethyl ether b) Methoxy ethane
 c) Ethylene oxide d) None of these
- Which of the following is an unsaturated acid?
 a) Citric b) Acrylic
 c) Phthalic d) Chloroacetic
- In diazotization reaction, primary aromatic amine is reacted with dil. HCl and _____.
 a) Sodium nitrate b) Silver nitrate
 c) Ammonium nitrate d) Sodium nitrite
- In R and S nomenclature system, the priority order is based on _____.
 a) Atomic weight b) Electronegativity
 c) Atomic number d) Mass number
- Absorption of UV radiations by organic molecule leads to _____.
 a) Electronic transitions b) Vibrational changes
 c) Rotational changes d) All of these

Q.2 Answer any Four of the following.

08

- Explain E and Z configuration with example.
- Write uses of glycerol.
- What is difference between aldehyde and ketone? Write one example of each.
- Write one method of preparation of trichloroacetic acid.
- Write uses of acrylic acid.
- Why trans cinnamic acid has higher λ_{max} value than cis cinnamic acid.

- Q.3 Write short notes on any Two of the following. 08**
- a) Gattermann synthesis and Kolbe reaction of phenol.
 - b) Perkin reaction with mechanism
 - c) Synthesis of congo red
- Q.4 Answer any Two of the following. 08**
- a) Explain pinacol- pinacolone rearrangement.
 - b) What is the action of acetic anhydride and HI on citric acid?
 - c) In Zeisel's method, 0.226×10^{-3} kg of an organic compound (Mol. Wt. 339 gm) gave 0.626×10^{-3} kg of silver iodide. Calculate percentage and number of $-OCH_3$ groups present in the organic compound.
- Q.5 Answer any One of the following 08**
- a) Define the terms chromophores, auxochromes, bathochromic shift and hypsochromic shift with example.
 - b) Describe conformational analysis of n-butane with the help of energy profile diagram.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper – V)
Data Structure (19201307)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagrams must be drawn wherever necessary.
 4) Use of log table and calculator is allowed.

Q.1 Choose the correct alternative.

08

- 1) Linked list is considered as an example of _____ type of memory allocation.
 - a) Dynamic
 - b) Static
 - c) Compile time
 - d) Heap
- 2) Which among the following data structure may give overflow error, even though the current number of elements in it, is less than its size?
 - a) Simple Queue
 - b) Circular Queue
 - c) Stack
 - d) None of the above
- 3) Which of the following sorting procedures is the slowest?
 - a) Quick sort
 - b) Heap sort
 - c) Shell sort
 - d) Bubble sort
- 4) The balance factor of a node in a binary tree is defined as _____.
 - a) addition of heights of left and right subtrees
 - b) height of right subtree minus height of left subtree
 - c) height of left subtree minus height of right subtree
 - d) height of right subtree minus one
- 5) The in order traversal of tree will yield a sorted listing of elements of tree in _____.
 - a) Binary trees
 - b) Binary search trees
 - c) Heaps
 - d) None of above
- 6) The dummy header in linked list contain _____.
 - a) First record of the actual data
 - b) Last record of the actual data
 - c) Pointer to the last record of the actual data
 - d) None of the above
- 7) A queue data-structure can be used for _____.
 - a) expression parsing
 - b) recursion
 - c) resource allocation
 - d) all of the above
- 8) If every node u in G is adjacent to every other node v in G, A graph is said to be _____.
 - a) isolated
 - b) complete
 - c) finite
 - d) strongly connected

- Q.2 Answer any Four of the following.** **08**
- a) Define dequeue.
 - b) What is Binary tree? List out various types of binary trees.
 - c) What is push and pop in stack?
 - d) What is postfix expression $A + (B / C) * D - E + F * G$.
 - e) What is doubly linked list?
 - f) What is binary tree?
- Q.3 Write short notes on any Two of the following.** **08**
- a) stack as ADT.
 - b) Bubble Sort technique.
 - c) Explain depth first search of a graph.
- Q.4 Answer any Two of the following.** **08**
- a) What is binary search Tree? Explain Tree traversal methods in detail.
 - b) Write a program of Insertion sort.
 - c) What is linked list? Explain various types of linked list.
- Q.5 Answer any One of the following.** **08**
- a) Write a program for dynamic implementation of Queue.
 - b) Write program of Adjacency matrix of a graph.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
CHEMISTRY (Paper – VI)
Inorganic Chemistry (19201306)

Day & Date: Thursday, 25-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagram and give equations wherever necessary.

Q.1 Choose the correct alternatives from the options. 08

- 1) Geometrical isomerism is also called as _____ isomerism.
 - a) cis-trans
 - b) *dl*
 - c) optical
 - d) structural
- 2) The interaction of hard acid with hard base can form _____ compound.
 - a) nonpolar
 - b) ionic
 - c) covalent
 - d) coordinate covalent
- 3) The purple colour of KMnCO_4 is due to _____.
 - a) charge transfer
 - b) d-d transition
 - c) d-f transition
 - d) charge transfer
- 4) During the formation of metal chelate, DMG can form _____ heterocyclic ring.
 - a) one
 - b) three
 - c) two
 - d) four
- 5) _____ is strongest Lewis acid.
 - a) Ag^+
 - b) Fe^+
 - c) H^+
 - d) Cd^+
- 6) Coordination sphere includes _____.
 - a) metal ion
 - b) ligand
 - c) nonmetals
 - d) metal and ligands
- 7) Magnetic measurements are employed to determine _____.
 - a) colour
 - b) oxidation state
 - c) electronic structure
 - d) complex formation
- 8) Chelating agents possess at least _____ donor groups.
 - a) three
 - b) two
 - c) one
 - d) four

Q.2 Answers any four of the following. 08

- a) Why d-block elements are called transition elements?
- b) Give any four limitations of VBT.
- c) Define the term ligand. Draw the structure of $[\text{Ni}(\text{DMG})_2]$.
- d) Cr and Cu show irregular electronic configuration, why?
- e) Give demerits of Lewis concepts.
- f) Define coordinate covalent bond. Give suitable examples.

- Q.3 Write short notes on any two of the following. 08**
- a) EDTA as a chelating agent.
 - b) Pearson's principle.
 - c) Comparison of first transition series with second and third transition series w.r.t. their reactivity and magnetic behavior
- Q.4 Answers any two of the following. 08**
- a) Distinguish between double salts and complex salts.
 - b) Explain the position of d-block elements in periodic table.
 - c) What is EAN? Calculate it for Fe in $K_4 [Fe(CN)_6]$ and $K_3[Fe(CN)_6]$
- Q.5 Answers any one of the following. 08**
- a) What do you mean by oxidation number? Explain the oxidation states of first transition series.
 - b) On the basis of VBT, explain formation $[Ni(CN)_6]^{2-}$. Comment on nature of bonding, hybridization and magnetic behaviour.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper-VI)
Design Analysis and Algorithm (19201308)

Day & Date: Thursday, 25-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

Q.1 Multiple choice questions.**08**

- 1) What is the worst case complexity of bubble sort?
 - a) $O(n \log n)$
 - b) $O(\log n)$
 - c) $O(n)$
 - d) $O(n^2)$
- 2) Dijkstra's Algorithm is used to solve _____ problems.
 - a) All pair shortest path
 - b) Single source shortest path
 - c) Network flow
 - d) Sorting
- 3) Which of the following is false in the case of a spanning tree of a graph G?
 - a) It is tree that spans G
 - b) It is a subgraph of the G
 - c) It includes every vertex of the G
 - d) It can be either cyclic or acyclic
- 4) Kruskal's algorithm is a _____.
 - a) divide and conquer algorithm
 - b) dynamic programming algorithm
 - c) greedy algorithm
 - d) approximation algorithm
- 5) What approach is being followed in Floyd Warshall Algorithm?
 - a) Greedy technique
 - b) Dynamic Programming
 - c) Linear Programming
 - d) Backtracking
- 6) Master's theorem is used for?
 - a) solving recurrences
 - b) solving iterative relations
 - c) analysing loops
 - d) calculating the time complexity of any code
- 7) Which type of graph has all the vertex of the first set connected to all the vertex of the second set?
 - a) Bipartite
 - b) Complete Bipartite
 - c) Cartesian
 - d) Pie
- 8) In Huffman coding, data in a tree always occur?
 - a) roots
 - b) leaves
 - c) left sub trees
 - d) right sub trees

Q.2 Answer any four of the following.**08**

- a) What are the characteristics of an algorithm?
- b) What is Time Complexity and space complexity?
- c) What is Exhaustive search?
- d) What are applications of greedy algorithm?
- e) What Amortized Analysis of algorithm?
- f) What is Dynamic Programming?

Q.3 Write short notes on any Two of the following.

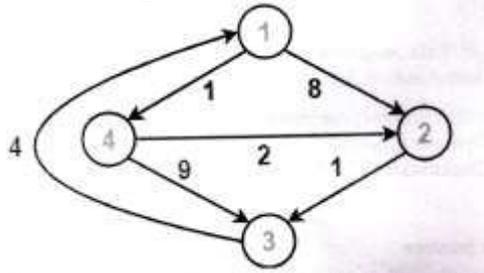
08

- Analyzing control statement.
- Minimum spanning tree.
- Prim's algorithm.

Q.4 Answer the any two of the following.

08

- Explain Brute force approach with its advantages and disadvantages.
- Explain Properties of Asymptotic Notations.
- Find the shortest path distance between every pair of vertices for following graph Using Floyd Warshall Algorithm



Q.5 Answer any one of the following.

08

- What is dynamic programming? How does dynamic programming work? Explain approaches of dynamic programming.
- Consider the problem having weights and profits are:
 Objects: 1 2 3 4 5 6 7
 Profits (P): 5 10 15 7 8 9 4
 Weight (w) 1 3 5 4 1 3 2
 The weight of the knapsack is 15 kg
 The number of items is 7
 The above problem can be solved by using the 0/1 knapsack problem method.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
PHYSICS (Paper - V)
General Physics and Sound (19201323)

Day & Date: Friday, 26-04-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicates full marks.
 3) Neat diagrams must be drawn wherever necessary.
 4) Use of log tables and calculator is allowed.

Q.1 Select correct alternatives:

08

- 1) The gradient of scalar function is _____ rate of change of function in space.
 - a) minimum
 - b) maximum
 - c) slow
 - d) constant
- 2) In general, the motion of gyroscope consists of _____.
 - a) Rotation, Precession & Nutation
 - b) Rotation & Precession
 - c) Rotation only
 - d) only Precession
- 3) The rise and fall of axis of rotation of a rotating body is called _____.
 - a) Precession
 - b) Nutation
 - c) Rotation
 - d) Vibration
- 4) Bending moment of the beam is _____.
 - a) Directly proportional to modulus of rigidity
 - b) Inversely proportional to radius of curvature
 - c) Directly proportional to radius of curvature
 - d) Inversely proportional to modulus of rigidity
- 5) The relation between magnitudes of precessional torque (τ_1) gravitational torque (τ_2) and centripetal torque (τ_3) is _____.
 - a) $\tau_1 = \tau_2 - \tau_3$
 - b) $\tau_1 = \tau_2 + \tau_3$
 - c) $\tau_1 = \tau_3 - \tau_2$
 - d) $\tau_2 = \tau_1 - \tau_3$
- 6) If height of liquid in rotation viscometer is increased, the rotation torque will be _____.
 - a) decreased
 - b) increased
 - c) Same
 - d) no affected
- 7) Searl's viscometer used to determine the viscosities of _____.
 - a) low viscous liquid
 - b) highly viscous liquid
 - c) any liquid
 - d) all of these
- 8) Decay of sound energy in hall is _____.
 - a) Linear
 - b) Exponential
 - c) Constant
 - d) Zero

- Q.2 Answer any FOUR the following. 08**
- a) What is Precession?
 - b) What is cantilever?
 - c) Define Bending moment.
 - d) What are the applications of Oswald's viscometer?
 - e) What is scalar triple product?
 - f) What is reverberation?
- Q.3 Write short notes on any TWO of the following. 08**
- a) Explain vector triple product.
 - b) Write a note on Gyroscope.
 - c) What are the requirements of good acoustics?
- Q.4 Answer any TWO of the following. 08**
- a) Explain the rotating cylinder method of determining the coefficient of viscosity?
 - b) Explain Sabine's experimental work and obtain expression for reverberation time.
 - c) Derive the expression of Young's modulus of wire by Searl's method.
- Q.5 Answer any ONE of the following. 08**
- a) Obtain an expression for angle of lean of the disc and radius of curvature of the path for rolling disc.
 - b) Define divergence of vector field and give physical significance of divergence of vector.

- Q.3 Write short notes on any two of the following.** **08**
- a) Write note on tertiary & quaternary structure of proteins.
 - b) Write the structure and role of Starch.
 - c) Write note on Structure and function of r-RNA.
- Q.4 Answer any two of the following.** **08**
- a) Write classification of lipids.
 - b) Explain Watson-Crick model of DNA.
 - c) Write the sources and biochemical role of retinol.
- Q.5 Answer any one of the following.** **08**
- a) What is oligosaccharides? Write structure and role of maltose, isomaltose and sucrose.
 - b) Write physical properties and chemical properties of amino acids and ninhydrin reaction of amino acids.

- Q.3 Write short notes on any Two of the following. 08**
- a) Role of organic farming in agriculture.
 - b) Nematicides
 - c) Resistant varieties.
- Q.4 Answer any Two of the following. 08**
- a) Write on tagging.
 - b) Explain in brief-biological control of insect pests.
 - c) Describe physical methods of plant protection.
- Q.5 Answer any One of the following. 08**
- a) Give the crop identification, soil type, tillage, seed rate & spacing, intercultural operation, fertilizers, irrigation, intercropping, yield & economic importance of Jawar.
 - b) Give the crop identification, soil type, tillage, seed rate & spacing, intercultural operation, fertilizers, irrigation, intercropping, yield & economic importance of soyabean.

- Q.2 Answers the following. (Any Four) 08**
- a) Draw the diagram of CRT.
 - b) State limitations of the transistor series power supply.
 - c) Write a note on Zener voltage regulator.
 - d) Define FET parameters.
 - e) What is Barkhausen criterion for oscillations?
 - f) Explain construction and working of colpitts oscillator.
- Q.3 Write short notes (Any Two) 08**
- a) Explain crystal oscillator with neat diagram.
 - b) Explain the working of the phase shift oscillator. State its advantages.
 - c) Explain the construction and working of dual power supply.
- Q.4 Answers the following. (Any Two) 08**
- a) Explain regulated power supply with block diagram. Explain its need.
 - b) Explain the principal and operation of the Hanley oscillator.
 - c) Draw the block diagram of the CRO and explain the function of each block.
- Q.5 Answers the following. (Any One) 08**
- a) Explain the construction, operation and characteristics of the unijunction transistor (UJT).
 - b) Explain transistor RC coupled amplifier with special reference to frequency response, advantage, disadvantage and applications.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
BIO-CHEMISTRY (Paper – II)
Biochemical Techniques (19201304)

Day & Date: Saturday, 27-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions.

08

- 1) The technique used for blot transfer of proteins is called _____ blotting technique.
 - a) northern
 - b) western
 - c) southern
 - d) eastern
- 2) For monitoring the migration of protein in starch gel electrophoresis _____ is used as a marker dye.
 - a) phenolphthalein
 - b) bromophenol blue
 - c) oil red
 - d) methyl orange
- 3) In Bradford protein assay, _____ dye used in the experiment.
 - a) Benedict's reagent
 - b) Coomassie brilliant blue
 - c) Methylene blue
 - d) Ethidium bromide
- 4) In spectrophotometer one side aluminium coated prism is used to _____.
 - a) absorb radiations
 - b) provide radiations
 - c) reflect radiations
 - d) split radiations
- 5) In polymerase chain reaction _____ accurately and rapidly changes the reaction temperature.
 - a) thermal cycle
 - b) electro blotter
 - c) ELISA plate
 - d) petri plate
- 6) In electrophoresis, DNA will migrate towards _____.
 - a) anode or negative electrode
 - b) anode or positive electrode
 - c) cathode or negative electrode
 - d) cathode or positive electrode
- 7) The ester value is the number of milligrams of potassium hydroxide required to saponify the esters present in _____ of the substance.
 - a) 1 gm
 - b) 1 mg
 - c) 1 kg
 - d) 1 liter
- 8) In spectrophotometer _____ converts light signals into electrical signals.
 - a) Photocell
 - b) mercury lamp
 - c) diagonal mirror
 - d) galvanometer

- Q.2 Answer any four of the following. 08**
- a) Write two applications of TLC.
 - b) Define transmission and absorbance.
 - c) Write two advantages of HPLC.
 - d) What is Bradford assay?
 - e) Define saponification value and ester value.
 - f) Write two significances of monoclonal antibodies.
- Q.3 Write short notes on any two of the following. 08**
- a) Describe the construction of photoelectric colorimeter.
 - b) Write note on mechanism of separation in HPLC.
 - c) Write note on 2 D electrophoresis.
- Q.4 Answer any Two of the following. 08**
- a) Write note on southern blotting.
 - b) Explain iodine number method for lipids.
 - c) Explain the technique of PCR.
- Q.5 Answer any one of the following. 08**
- a) What is chromatography? Explain principle, technique and applications of TLC.
 - b) Define electrophoresis and write principle technique and applications of agarose gel electrophoresis.

- Q.3 Answer any Two of the following. 08**
- a) Control measures of Downy mildew of Grapes.
 - b) Kitch 's Postulates
 - c) Methods of inoculation
- Q.4 Answer any Two of the following. 08**
- a) Give an account on classification of plant diseases.
 - b) Write on Assessment of diseases in crop plant.
 - c) Describe the Little leaf of Brinjal.
- Q.5 Answer any One of the following. 08**
- a) Describe in details about Grain smut of jawar.
 - b) Write the Principles of plant disease management.

8) If a continuous r. v. (X, Y) has joint p. d. f. $f(x, y)$ then $E(XY) = \underline{\hspace{2cm}}$.

- a) $\left(\sum_x xf(x)\right)\left(\sum_y yf(y)\right)$ b) $\iint xy f(x, y)dx dy$
 c) $\left(\int x f(x)dx\right)\left(\int y f(y)dy\right)$ d) both (b) and (c) are true

Q.2 Answer any four of the following. 08

- a) Define Geometric distribution.
 b) State mean and variance of negative binomial distribution.
 c) Define expectation of random variable X.
 d) Define Marginal density function of X.
 e) Define Conditional expectation.

Q.3 Write short notes on any two of the following. 08

- a) Find mean and variance of Poisson distribution.
 b) The proportion of cloud cover at a particular meteorological office is given by the p.d.f.

$$f(x) = \begin{cases} 12x(1-x)^2 & ; 0 < x < 1 \\ 0 & ; \text{otherwise} \end{cases}$$
 Find Mean and variance.
 c) State and prove addition theorem of expectation.

Q.4 Answer any two of the following. 08

- a) State and prove memory less property of geometric distribution.
 b) The random variable X has the probability density function.

$$f(x) = \begin{cases} ax + bx^2 & ; 0 \leq x \leq 1 \\ 0 & ; \text{otherwise} \end{cases}$$
 If $E(X) = 0.6$, find a and b .
 c) Let (X, Y) have the joint density function.

$$f(x, y) = \begin{cases} \frac{2}{3} & ; 0 < x < 1, x < y < 2 \\ 0 & ; \text{otherwise} \end{cases}$$
 Verify whether X and Y are independent.

Q.5 Answer any one of the following. 08

- a) The random variable X has probability density function defined by

$$f(x) = \begin{cases} \frac{1}{2} & ; 0 \leq x \leq 1 \\ \frac{1}{18}(x-4)^2 & ; 1 \leq x \leq 4 \\ 0 & ; \text{otherwise} \end{cases}$$
 1) Find the distribution function of x hence find the value of median.
 2) Determine $P(2 \leq X \leq 3)$
 b) Let X and Y be bivariate random variables having joint density function

$$f(x, y) = \begin{cases} \frac{3}{5}x(x+y) & ; 0 \leq x \leq 1, 0 \leq y \leq 2 \\ 0 & ; \text{otherwise} \end{cases}$$
 Find
 1) $E(X)$ 2) $E(Y)$
 3) $E(X + Y)$ 4) $E(XY)$

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
METEOROLOGY (Paper – I)
Climatology (19201321)

Day & Date: Monday, 29-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Choose the correct alternative and rewrite sentences:**08**

- 1) An _____ is an immense body of air.

a) front	b) air mass
c) frontolysis	d) humidity
- 2) _____ Winds are called as primary circulation.

a) Local	b) Seasonal
c) Regional	d) Planetary
- 3) Ozone occupies _____% gaseous in the atmosphere.

a) 0.06	b) 12
c) 0.03	d) 0.00006
- 4) The coriolis force is _____ in high latitudes.

a) strongest	b) weak
c) strong	d) absent
- 5) _____ Latitudes called as horse latitude.

a) 10° to 20°	b) 15° to 25°
c) 20° to 30°	d) 25° to 35°
- 6) The line of equal surface pressure of atmosphere is called as _____.

a) isotherm	b) isohytes
c) isohaline	d) isobar
- 7) Typhoon cyclone exists in _____.

a) Japan	b) China
c) Australia	d) USA
- 8) Tamil Nadu receives rainfall during winter due to _____.

a) monsoon	b) advancing monsoon
c) seasonal	d) retreat monsoon

Q.2 Answer any Four of the following.**08**

- a) What is mean by general circulation?
- b) Types of air masses.
- c) Regional climatology?
- d) Define climatology?
- e) Elements of weather.
- f) Define monsoon.

- Q.3 Write short notes on any Two of the following. 08**
- a) Composition of the atmosphere.
 - b) Explain branches of Climatology.
 - c) Sources region of air masses.
- Q.4 Answer any Two of the following. 08**
- a) Explain the life cycle of cyclone.
 - b) Discuss on Climatic records and statistics.
 - c) Discuss on upper air circulation pattern.
- Q.5 Answer any One of the following. 08**
- a) Explain the planetary wind system.
 - b) Give an account of North eastern monsoon in India.

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Set **P**

B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
GEO - CHEMISTRY (Paper – I)
Introduction to Geochemistry (19201313)

Day & Date: Monday, 29-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Choose the correct alternative and rewrite sentences:**08**

- 1) Co-ordination number is a characteristic of _____.
 a) coordination compound b) coordination entity
 c) central atom d) ligand
- 2) For one component system when degree of freedom is 1, then number of phases _____.
 a) 3 b) 1
 c) 0 d) 2
- 3) The coordination number for CsCl structure is _____.
 a) 8 b) 6
 c) 4 d) 2
- 4) The components of a colloidal solution are _____.
 a) 1 b) 2
 c) 3 d) 4
- 5) The factor that affect phase rule is _____.
 a) gravity b) concentration
 c) magnetic force d) electrical force
- 6) Clay particles behaves like _____.
 a) non-colloids b) colloids
 c) amorphous solids d) crystalline particles
- 7) All the three phases of a system exists at _____.
 a) vapour point b) sublimation point
 c) eutectic point d) triple point
- 8) At equilibrium the total Gibb's free energy for all phases is _____.
 a) minimum b) maximum
 c) infinity d) zero

Q.2 Answer any four of the following.**08**

- a) What is coordination number? Write coordination number for NaCl.
- b) What is molecular formula?
- c) What is meant by atomic radii in a crystal?
- d) Write two electrical properties of colloids.
- e) Which factors affect the phase diagram?
- f) Write four examples of colloids.

- Q.3 Write short notes on any two of the following. 08**
- a) Write note on clay minerals as colloids.
 - b) Explain silica as chemical-sediment.
 - c) Explain one component (water and sulphur) system.
- Q.4 Answer any Two of the following. 08**
- a) Explain Gibbs phase rule.
 - b) Explain general rules of the three dimensional structure with the help of solid geometry.
 - c) Explain empirical formula of organic compound.
- Q.5 Answer any one of the following. 08**
- a) What is radius ratio? Explain structure of Zinc Sulphide, Cesium Chloride.
 - b) What is homologous series and describe general characteristics of organic compounds.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper – V)
Cell Biology (19201331)

Day & Date: Monday, 29-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Choose the correct alternative and rewrite sentences:**08**

- 1) Prokaryote is a _____ called organisms.
 - a) single
 - b) double
 - c) triple
 - d) none of these
- 2) _____ is Microorganisms that made up of single Prokaryotic cells.
 - a) Bacteria
 - b) Virus
 - c) Viroid
 - d) None of these
- 3) In Bacterial cell, the genetic material stored in _____.
 - a) Nucleoid
 - b) Nucleus
 - c) Plasma membrane
 - d) None of these
- 4) Human Genetic diseases are called _____.
 - a) Lysosomal disease
 - b) Mitochondria disease
 - c) Viral disease
 - d) None of these
- 5) Cell division of body cells called as _____.
 - a) Mitosis
 - b) Meiosis
 - c) Blastula
 - d) None
- 6) The Microscopic Infectious agent that replicate on inside of living cells of organisms called as _____.
 - a) Virus
 - b) Fungus
 - c) Bacteria
 - d) None of these
- 7) Microtubules are found in _____ cell.
 - a) Eukaryotype cell
 - b) Prokaryotype cells
 - c) Plasma membrane
 - d) None of these
- 8) _____ Cell organelle called power house of Energy.
 - a) Mitochondria
 - b) Lysosome
 - c) Endoplasmic Reticulum
 - d) None of these

Q.2 Answer any Four of the following.**08**

- a) Plasma Membrane
- b) Structure & Function of Mitochondria
- c) Lysosomes
- d) Microfilaments
- e) Nuclear Envelope

- Q.3 Write short notes on any Two of the following. 08**
- a) Cell cycle
 - b) Meiosis
 - c) Role of Chromatin
- Q.4 Answer any Two of the following. 08**
- a) Type of cell Signalling.
 - b) Structure & Function of Nucleus.
 - c) Role of secondary Messengers.
- Q.5 Answer any One of the following. 08**
- a) Give Brief idea of G-Protein.
 - b) Describe in detail Cytoskeleton.

- Q.3 Write short notes on any two the following:** **08**
- a) Define C.D.R. and S.D.R.
 - b) State and prove any two properties of residuals.
 - c) Compare SRSWR and SRSWOR
- Q.4 Answer any two of the following:** **08**
- a) With usual notations prove that,
$$1 - R^2_{1.23} = (1 - r^2_{12})(1 - r^2_{13.2})$$
 - b) Show that sample mean is unbiased estimate of population mean in case of SRSWOR.
 - c) Explain the criteria of detecting lack of control chart.
- Q.5 Answer any one of the following** **08**
- a) Derive the equation of the least square plane of regression equation of X_1 on X_2 and X_3 .
 - b) With usual notations, prove that
$$\text{var}(\bar{y}_n)_{wr} = \frac{n-1}{Nn} S^2$$

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
METEOROLOGY (Paper – II)
General Meteorology (19201322)

Day & Date: Tuesday, 30-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions.

08

- 1) Meteorology is science of _____.
 a) climate
 b) atmosphere
 c) environment
 d) weather
- 2) Which of the following has the highest entropy?
 a) Liquid nitrogen
 b) Diamond
 c) Air
 d) Mercury
- 3) Entropy _____.
 i) is measure of disorder or randomness of the system.
 ii) is measure of order of the system.
 iii) never increases in a closed system such as universe.
 iv) never decrease in a closed system such as universe.
 a) i and iii are correct
 b) i and iv are correct
 c) ii and iii are correct
 d) ii and iv are correct
- 4) The frame of reference associated with spinning earth is _____.
 a) accelerated
 b) unaccelerated
 c) steady
 d) nonrotating
- 5) Which of the following force occurs in non-inertial frames of reference?
 a) Pressure gradient
 b) Coriolis
 c) Frictional
 d) Gravitational
- 6) The output voltage of single solar cell is about _____ volts.
 a) 0.2
 b) 0.5
 c) 1.0
 d) 2.0
- 7) A solar cell has _____ sensitive junction.
 a) light
 b) heat
 c) temperature
 d) moisture
- 8) Which of the following is the correct expression for work?
 a) $W = \vec{F} \cdot \vec{S}$
 b) $W = \vec{F} \times \vec{S}$
 c) $W = \vec{r} \times \vec{F}$
 d) $W = -(\vec{F} \times \vec{S})$

- Q.2 Answer any Four of the following.** **08**
- a) For diffused reflection the angle of incidence is 35 degrees. Calculate angle of reflection.
 - b) Define atmosphere.
 - c) What are effects of depletion of ozone layer?
 - d) What is pressure gradient force?
 - e) A typical output of a solar cell is $V=0.45$ volts and $I=15$ mA. How much will be its power output in milliwatts?
 - f) What is energy in energy technology?
- Q.3 Write short notes on any Two of the following.** **08**
- a) State Buys-Ballots law.
 - b) Discuss energy demand.
 - c) What are various forms of energy?
- Q.4 Answer any Two of the following.** **08**
- a) How is an ozone molecule broken and depletion of ozone layer in the stratosphere takes place?
 - b) Write a note on Ozone in the troposphere.
 - c) Discuss geostrophic wind.
- Q.5 Answer any One of the following.** **08**
- a) Explain general composition of the Earth's atmosphere.
 - b) Draw neat diagram of a solar cell. Explain its working.

- Q.2 Answer any four of the following: 08**
- a) What is the structure of Siderites?
 - b) What is the average composition of Terrestrial water?
 - c) Alloys of which metals are found in most of the meteorites?
 - d) Name the geochemical elements which have the affinity towards sulphides.
 - e) Names the major constituents of Atmosphere.
 - f) What is the average composition of Mantle?
- Q.3 Write short notes on any two of the following: 08**
- a) Atmospheric addition and losses during geologic time.
 - b) Composition of Sun.
 - c) Cosmic abundance of elements.
- Q.4 Answer any two of the following: 08**
- a) Describe the nature of hydrosphere with gains and losses of elements in the oceanic water.
 - b) Explain in brief the primary differentiation of the elements.
 - c) Discuss the in brief, composition of Meteorites and their types.
- Q.5 Answer any one of the following: 08**
- a) Describe in brief the zonal structure of the Earth.
 - b) Describe the structure of the atmosphere. Add note on evolution of atmosphere.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper-VI)
Principles of Ecology (19201332)

Day & Date: Tuesday, 30-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N= 14, Na =23, Cl = 35.5)

Q.1 Multiple choice questions.

08

- 1) _____ is the study of the relationships between living organisms, including humans, and their physical environment.
 - a) Ecosystem
 - b) Ecotone
 - c) Ecology
 - d) Ecotourism
- 2) A. G. Transley coined the term _____.
 - a) Ecosystem
 - b) Ecotone
 - c) Ecology
 - d) Ecotourism
- 3) _____ is defined as the rate of death per unit area of people per unit of time.
 - a) Natality
 - b) Population
 - c) Survival curve
 - d) Mortality
- 4) A _____ is a graph showing the number or proportion of individuals surviving to each age for a given species or group.
 - a) Population density
 - b) Survivor curve
 - c) Log table
 - d) Life table
- 5) _____ is generally defined as a relationship between the two living species in which one organism is benefitted at the expense of the other.
 - a) Predation
 - b) Parasitism
 - c) Commensalism
 - d) Mutualism
- 6) A relationship between individuals of two species in which one species obtains food or other benefits from the other without either harming or benefiting the latter is called _____.
 - a) Commensalism
 - b) Mutualism
 - c) Predation
 - d) Parasitism
- 7) Grass → deer → tiger is an example of _____ in forest ecosystem.
 - a) Food web
 - b) Food chain
 - c) Food cycle
 - d) Food round
- 8) _____ is a geographic region that is a reservoir of biodiversity and is highly vulnerable because of destruction.
 - a) Hot spots
 - b) Ecosystem
 - c) Sanctuary
 - d) Sacred groove

- Q.2 Answer any four of the following. 08**
- a) Difference between autecology and synecology.
 - b) Define ecosystem.
 - c) Characteristics of lotic ecosystem.
 - d) Example of food chain in grassland ecosystem.
 - e) Define Sacred grooves.
 - f) Ecological Pyramid.
- Q.3 Write short notes on any two of the following. 08**
- a) Give an account on life table.
 - b) Describe marine ecosystem.
 - c) Explain causes of loss of biodiversity.
- Q.4 Answer any two of the following. 08**
- a) Define mortality? Give an account on mortality.
 - b) Define mutualism? Explain mutualism with suitable examples.
 - c) Describe desert ecosystem.
- Q.5 Answer any one of the following. 08**
- a) Describe effect of temperature and light on animals.
 - b) Describe types of Biodiversity.

Q.2 Attempt any Four of the following.

- a) Define Maximum and Minimum.
- b) Define Jacobian for $J(u, v, w)$ of $\frac{\partial(u,v,w)}{\partial(x,y,z)}$
- c) Define Curvature and Radius of Curvature.
- d) Find polar subtangent and subnormal for the curve $r = a(1 + \cos \theta)$
- e) Find equation of tangent and normal for $y = f(x)$.
- f) Find the radius of Curvature at any point for $s = c \tan \Psi$.

Q.3 Attempt any Two of the following.

08

- a) Derive Pedal equation or p.r. equation for the curve $y = f(x)$.
- b) Find Maximum and Minimum value for the function $f(x) = 8x^5 - 15x^4 + 10x^2$
- c) Find Radius of Curvature for the curve $r = a(1 - \cos \theta)$.

Q.4 Attempt any Two of the following.

08

- a) If $x = r \cdot \cos \theta$ & $y = r \sin \theta$ then show that $\frac{\partial(x,y)}{\partial(r,\theta)} = r$
- b) Explain Length of polar sub-tangent and polar subnormal.
- c) Find the radius of Curvature at point $\left(\frac{3a}{2}, \frac{3a}{2}\right)$ for the curve $x^3 + y^3 = 3axy$

Q.5 Attempt any One of the following.

08

- a) If $x = e^u \cdot \cos v$ & $y = e^u \cdot \sin v$ then show that $\frac{\partial(x,y)}{\partial(u,v)} \cdot \frac{\partial(u,v)}{\partial(x,y)} = 1$
- b) Find the radius of curvature for parametric equation $x = f(t)$ and $y = g(t)$

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
BOTANY (Paper – V)
Plant Anatomy (19201301)

Day & Date: Thursday, 02-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equation wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of logarithm table and calculator is allowed.

Q.1 Multiple choice questions.

08

- 1) The term meristem is derived from Greek word _____ meaning divisible.
 - a) Meristo
 - b) Aeristo
 - c) Xeristo
 - d) Neristo
- 2) Based on origin in the plant, the meristems are classified as _____.
 - a) Primary
 - b) Secondary meristems
 - c) both a and b
 - d) None of these
- 3) Histogen theory was proposed by _____ in 1870.
 - a) Hanstein
 - b) Manstein
 - c) Wanstein
 - d) Danstein
- 4) Simple tissues are made up of _____ type of cells.
 - a) Four
 - b) Five
 - c) Two
 - d) One
- 5) A complex tissue is made up of _____ than one type of cells.
 - a) Less
 - b) More
 - c) Both a & b
 - d) None of these
- 6) The _____ root system is the characteristic of monocotyledons.
 - a) Adventitious
 - b) Tap
 - c) both a and b
 - d) None of these
- 7) The region inside the _____ is called the stele.
 - a) Epidermis
 - b) Cortex
 - c) Endodermis
 - d) Xylem
- 8) Increase in girth or thickness due to the activity of cambium is called _____.
 - a) Primary
 - b) Secondary
 - c) both a and b
 - d) None of these

Q.2 Answer any four of the following.

08

- a) Define tissue.
- b) What is meristem?
- c) Define anatomy.
- d) Write the definition of vascular plant.
- e) What is mean by primary growth?
- f) Define periderm.

- Q.3 Write short notes on any two of the following** **08**
- a) Wood types.
 - b) Apical cell theory.
 - c) Parenchyma
- Q.4 Answer any two of the following.** **08**
- a) Explain the sclerenchyma studied by you.
 - b) Describe the xylem complex tissue with suitable diagrams.
 - c) Explain the general character of monocot root.
- Q.5 Answer any one of the following** **08**
- a) Describe the primary structure of monocot root.
 - b) Explain the anomalous secondary growth of bignonia stem.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper - VI)
Laplace Transform (19201320)

Day & Date: Friday, 03-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Multiple choice question.

08

1) $L\left\{\frac{\sin t}{t}\right\} = \underline{\hspace{2cm}}$.

a) $\tan^{-1} p$

b) $\tan^{-1}\left\{\frac{1}{p}\right\}$

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

d) $\cot^{-1}\left\{\frac{1}{p}\right\}$

2) $L\{5t - a\} = \underline{\hspace{2cm}}$.

a) $\frac{ap - 5}{p^2}$

b) $\frac{a - 5p}{p^2}$

c) $\frac{5 - ap}{p^2}$

d) $\frac{a - p}{25}$

3) The value of the integral $\int_0^{\infty} e^{-5t} \sinh^3 t \, dt = \underline{\hspace{2cm}}$.

a) $\frac{17}{39}$

b) $\frac{1}{51}$

c) $\frac{1}{64}$

d) $\frac{6}{39}$

4) If $L\left\{2\frac{\sqrt{t}}{\pi}\right\} = \frac{1}{p^{3/2}}$ then $L\left\{\frac{1}{\sqrt{\pi t}}\right\} = \underline{\hspace{2cm}}$.

a) $\frac{1}{p^{1/3}}$

b) $\frac{1}{p^{2/3}}$

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

d) $\frac{1}{p^{1/2}}$

5) $L^{-1}\left\{\frac{3}{p^2-3}\right\} = \underline{\hspace{2cm}}$.

a) $\sqrt{3} \cosh \sqrt{3}t$

b) $\sqrt{3} \sinh \sqrt{3}t$

c) $\sin \sqrt{3}t$

d) $\frac{\cosh \sqrt{3}t}{\sqrt{3}}$

Q.5 Answer any one of the following.

a) State and prove Convolution theorem and where solve $L^{-1}\left\{\frac{1}{(p+1)(p+3)}\right\}$

b) If $c(t) = \int_t^{\infty} \frac{\cos x}{x} dx$ then prove that $L\{c(t)\} = \frac{wg(p^2+1)}{2p}$

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Set **P**

B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
BOTANY (Paper – VI)
Plant Metabolism (19201302)

Day & Date: Friday, 03-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N= 14, Na =23, Cl = 35.5)

Q.1 Multiple choice questions.**08**

- 1) This statement about enzymes is true.
 - a) Enzymes accelerate reactions by lowering the activation energy
 - b) Enzymes are proteins whose three-dimensional form is key to their function
 - c) Enzymes do not alter the overall change in free energy for a reaction
 - d) All of these
- 2) Enzymes are polymers of:

a) Hexose	b) Amino acids
c) Fatty acids	d) Inorganic phosphate
- 3) Which of the following is a Growth inhibitor?

a) Gibberellin	b) Auxin
c) Ethylene	d) Cytokinin
- 4) _____ is a Growth promoter.

a) ABA	b) Ethylene
c) Cytokinin	d) 2,4D
- 5) Nitrogen is absorbed by the plants in the form of _____.

a) Ammonium	b) Nitrites
c) Nitrates	d) All
- 6) Symbiotic nitrogen-fixing cyanobacteria are not present in _____.

a) Azolla	b) Gnetum
c) Anthoceros	d) Cycas
- 7) Which of the following is the general formula of Carbohydrates?

a) $(C_4 H_2O)_n$	b) $(C_6 H_2O)_n$
c) $(CH_2O)_n$	d) $(C_2 H_2O)_n COOH$
- 8) Which of the following are the major functions of Carbohydrates?
 - a) Storage
 - b) Structural framework
 - c) Transport Materials
 - d) Both Storage and structural framework

- Q.2 Answer any Four the following.** **08**
- a) Define carbohydrate.
 - b) What is enzyme?
 - c) Enlist the plant growth regulators.
 - d) Define micronutrients.
 - e) Enlist the examples of Monosaccharaides.
- Q.3 Write short note on any Two of the following.** **08**
- a) Describe any four types of enzymes with examples.
 - b) Explain the role of micro and micro nutrients in plant growth.
 - c) Explain the properties of biological nitrogen fixation.
- Q.4 Attempt any Two of the following.** **08**
- a) Explain properties and examples of polysaccharides.
 - b) Write a short note on growth regulators.
 - c) Give the classification of enzyme with examples.
- Q.5 Attempt any One of the following.** **08**
- a) Define macronutrients and enlist the roles of N, P, K
 - b) Describe significance of biological nitrogen fixation.

- Q.2 Answer any Four of the following. 08**
- a) Explain the role of filter capacitor.
 - b) Why the operating point Q should be at the center of the dc load-line?
 - c) What are the different amplifier configurations?
 - d) What do you mean by negative and positive feedback?
 - e) What is Barkhausen criterion?
- Q.3 Write short note on any Two of the following. 08**
- a) Zener Regulator
 - b) Class-B push-pull amplifier
 - c) Stability factor of Emitter-bias method
- Q.4 Answer any Two of the following. 08**
- a) Explain transformer-coupled amplifier.
 - b) Explain the effect of negative feedback on voltage-gain and bandwidth of an amplifier.
 - c) Discuss in short Wien-bridge oscillator. Give the equation for frequency of oscillation.
- Q.5 Answer any One of the following 08**
- a) Explain the analysis of Common-Emitter amplifier with voltage-divider bias. Obtain the equations for voltage-gain, input and output impedance.
 - b) Give the analysis of Current-series feedback circuit and hence obtain the equations for voltage-gain and feedback factor.

- Q.3 Write short notes on any Two of the following. 08**
- a) Jetstream
 - b) Pressure belt
 - c) Weather & climate
- Q.4 Answer any Two of the following. 08**
- a) Heating & cooling of the land & water.
 - b) Explain the types of humidity.
 - c) Composition of atmosphere.
- Q.5 Answer any One of the following. 08**
- a) Explain the factors affecting on distribution of temperature?
 - b) Explain the structure of the atmosphere.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
GEOLOGY (Paper – V)
Igneous Petrology (19201315)

Day & Date: Saturday, 04-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagram wherever necessary.
 3) Figures to right indicate full marks.

Q.1 Multiple choice questions.**08**

- 1) Basalt is _____ igneous rock.
 - a) intrusive
 - b) volcanic
 - c) plutonic
 - d) None of these
- 2) _____ is medium grained igneous rock.
 - a) Basalt
 - b) Trachyte
 - c) Pegmatite
 - d) dolerite
- 3) The essential mineral in pegmatite rock are _____.
 - a) Quartz, feldspar
 - b) Quartz, Augite
 - c) Quartz, olivine
 - d) olivine, Augite
- 4) Uni component rocks are extremely _____.
 - a) Abundant
 - b) Moderate
 - c) Rare
 - d) None of these
- 5) Silica minerals are rare _____ rock.
 - a) Acidic
 - b) Ultrabasic
 - c) Basic
 - d) None of these
- 6) The basic magma rich in _____.
 - a) Si, Na and K
 - b) Si, Mg and Fe
 - c) K, Mg and Al
 - d) Fe and Mg
- 7) The undeveloped crystal faces in Igneous rock are called _____.
 - a) euhedral
 - b) anhedral
 - c) subhedral
 - d) None of these
- 8) The reaction relation began the crystallization of mineral in magma is _____.
 - a) Olivine
 - b) Pyroxene
 - c) Amphibole
 - d) quartz

Q.2 Answer any Four of the following.**08**

- a) Define igneous rock?
- b) What is magma and lava?
- c) What is eutectic point?
- d) What is texture in igneous rock?
- e) Define holohyaline texture.
- f) What is euhedral grains?

- Q.3 Write short notes on any Two of the following.** **08**
- a) Describe the sill and dike.
 - b) Describe hypabyssal igneous rock.
 - c) Describe the glass and crystals.
- Q.4 Answer any Two of the following.** **08**
- a) Describe any two discordant forms of igneous rock.
 - b) Describe the crystallization of bicomponent magma.
- Q.5 Answer any One of the following** **08**
- a) Describe process of formation of igneous rock.
 - b) Describe the differentiation process.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper – V)
Bacterial Cytology and Physiology (19201317)

Day & Date: Saturday, 04-05-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.

Q.1 Multiple choice questions.

08

- 1) _____ Gram negative bacteria does not contain peptidoglycan in their cell wall.
 - a) Bacillus spp.
 - b) E.coli
 - c) Halobacterium
 - d) Staphylococcus spp.
- 2) In the peptidoglycan two amino-acylated sugars are linked by _____ linkage.
 - a) β 1 – 4
 - b) α 1 – 4
 - c) β 1 – 3
 - d) α 1 – 3
- 3) To counteract gravitational force or pull, some bacterial cells possess _____.
 - a) Chlorobium vesicles
 - b) Carboxysomes
 - c) Gas Vacuoles
 - d) Magnetosomes
- 4) Net gain of ATP by substrate level phosphorylation in EMP pathway is _____.
 - a) 8
 - b) 0
 - c) 38
 - d) 2
- 5) Azotobacter species form thick walled, desiccation resistant dormant structures called _____.
 - a) Spores
 - b) Endospores
 - c) Cysts
 - d) None of these
- 6) The time taken by bacteria to double the population is called as _____.
 - a) Growth rate
 - b) Generation time
 - c) Bacterial growth
 - d) None of these
- 7) Heavy metals at low concentration acts as _____.
 - a) Cofactor
 - b) Coenzyme
 - c) Apo enzyme
 - d) Isoenzymes
- 8) The final electron acceptor in aerobic respiration is _____.
 - a) Molecular Oxygen
 - b) NO_3
 - c) SO_4
 - d) All of the above

- Q.2 Answer any Four of the following. 08**
- a) Enlist the functions of the cell membrane.
 - b) Draw and label the detailed structure of flagella.
 - c) Draw and label the detailed structure of bacterial endospore.
 - d) Describe in Short about the pili.
 - e) Write in short the magnetosomes.
 - f) Define Active and Passive Transport.
- Q.3 Write short notes on any Two of the following. 08**
- a) Define growth and explain in detail the growth phases of bacteria.
 - b) Describe in short about the effect of osmotic pressure on bacteria.
 - c) Describe in short ethanol fermentation.
- Q.4 Answer any Two of the following. 08**
- a) Describe in short about mesosomes and their functions.
 - b) Describe in short about non nitrogenous reserve food material.
 - c) Describe in short about Synchronous growth.
- Q.5 Answer any One of the following. 08**
- a) Describe in detail about Germination of endospore.
 - b) Describe in detail about the effect of temperature on growth of microorganisms.

Seat
No.

B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper - VI)
Pulse & Switching Circuits (19201310)

Day & Date: Thursday, 09-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions**08**

- 1) _____ circuit is used to remove a certain portion of the waveforms.
 - a) Differentiator
 - b) Clipper
 - c) Clamper
 - d) Integrator
- 2) A bistable multivibrator is a _____ oscillator.
 - a) triggered
 - b) free running
 - c) sine wave
 - d) saw tooth
- 3) The formula for calculating the pulse width of a monostable multivibrator using IC 555 is _____.
 - a) $W = 0.96RC$
 - b) $W = 0.69RC$
 - c) $W = RC$
 - d) $W = 1.1RC$
- 4) Astable multivibrator is formed by using _____.
 - a) single NAND gate
 - b) double NAND gate
 - c) triple NAND gate
 - d) All of these
- 5) The time for charging the capacitor from $1/3 V_{CC}$ to $2/3 V_{CC}$ in an astable multi-vibrator using 555 is _____.
 - a) $0.693 (R_A R_B) C$
 - b) $0.693 (2R_A + R_B) C$
 - c) $0.693 (R_A + 2R_B) C$
 - d) $0.693 (R_A + R_B) C$
- 6) _____ circuit is used to pass low frequencies.
 - a) Differentiating
 - b) Clamping
 - c) Integrating
 - d) Rectifying
- 7) A transistor used as a switch then it is operated in _____.
 - a) saturation region
 - b) active region
 - c) cut-off and active region
 - d) cut-off and saturation region
- 8) The frequency of oscillation of an astable multivibrator depends on _____.
 - a) duration of the input pulse
 - b) value of current gain (h_{fe}) of a transistor
 - c) value of R and C
 - d) value of the collector load resistor

- Q.2 Answer any Four of the following.** **08**
- a) State different types of nonlinear wave-shaping circuits.
 - b) What is the need for time base signal?
 - c) Define the sweep time and restoration time.
 - d) Calculate the frequency of an astable multivibrator using BJT if the timing components are $R_1 = R_2 = 10\text{ K}\Omega$ and $C_1 = C_2 = 100\mu\text{F}$.
 - e) Draw the circuit diagram of a monostable multivibrator using NAND gates.
- Q.3 Write short notes on any Two of the following:** **08**
- a) What is a clamper circuit? Explain the positive clamper circuit.
 - b) Explain the working of the sequential timer circuit using IC 555.
 - c) Explain the working of the RC differentiator circuit.
- Q.4 Answer any Two of the following:** **08**
- a) Explain in the brief working of an astable multivibrator using IC 555.
 - b) Explain the working of a monostable multi-vibrator using IC 74121.
 - c) Explain Miller Integrator with a suitable circuit diagram.
- Q.5 Answer any One of the following:** **08**
- a) Explain the construction and working of the Schmitt trigger with its Hysteresis curve.
 - b) Explain in brief the working of UJT as a relaxation oscillator with necessary waveforms and derive an expression for sweep frequency.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
GEOGRAPHY (Paper - VI)
Geography of India (19201312)

Day & Date: Thursday, 09-05-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagram wherever necessary.
 3) Use of stencil is allowed.

Q.1 Multiple choice questions.

08

- 1) _____ is passed through the center of India.
 - a) Tropic of Capricorn
 - b) Tropic of Cancer
 - c) Equator
 - d) None of above
- 2) _____ type of soil is found in Rajasthan.
 - a) Black
 - b) Desert
 - c) Alluvial
 - d) Red
- 3) In India _____ rank first in Rice Production.
 - a) Maharashtra
 - b) Rajasthan
 - c) West Bengal
 - d) Gujarat
- 4) In _____ Konkani language is spoken.
 - a) Rajasthan
 - b) Tamil Nadu
 - c) Kerala
 - d) Maharashtra
- 5) As per 2023 _____ is the most populated country in the world.
 - a) Pakistan
 - b) India
 - c) Sri Lanka
 - d) Brazil
- 6) The kharif season beings _____.
 - a) In December
 - b) With the onset of south western monsoon
 - c) At the end of the south western monsoon
 - d) In March
- 7) Bombay high is famous for _____.
 - a) Petroleum
 - b) Gold
 - c) Coal
 - d) Iron
- 8) _____ is primary economic activity.
 - a) Agriculture
 - b) Trade
 - c) Industry
 - d) Information Technology

Q.2 Answer any Four of the following.

08

- a) What is tribe?
- b) What is soil?
- c) What is industry?
- d) What is information technology?
- e) What is population density?
- f) What is resources?

- Q.3 Write short notes on any Two of the following. 08**
- a) Population Growth of India
 - b) Automobile Industry in India
 - c) Importance of forest
- Q.4 Answer any Two of the following. 08**
- a) Explain the distribution of Coal in India.
 - b) Explain the distribution of population on the basis of Religion.
 - c) Explain the Climatic regions of India.
- Q.5 Answer any One of the following. 08**
- a) What is Regionalization? Explain the economic regionalization of India.
 - b) Explain the causes of Population growth in India.

- Q.3 Write short notes on any two of the following. 08**
- a) Lamination structure
 - b) Granulite Facies
 - c) Marble
- Q.4 Answer any two of the following. 08**
- a) Describe Clastic structure.
 - b) Explain Bauxite.
 - c) Explain different Sizes of sediments.
- Q.5 Answer any one of the following questions. 08**
- a) Define Sedimentary rocks. Describe Rudaceous deposits.
 - b) Define Metamorphic rocks. Describe Schistose and Granulose structures.

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**B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper - VI)
Bacterial Genetics (19201318)**

Day & Date: Thursday, 09-05-2024
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary.
3) Figures to right indicate full marks.

Q.1 Choose the correct alternative and rewrite the sentences again. 08

- 1) The activity of AP endonuclease is involved in _____ excision repair.
 - a) Base
 - b) Nucleotide
 - c) Mismatch
 - d) Photoreactivation
- 2) The minimal genetic unit responsible for recombination is called as _____.
 - a) Muton
 - b) Recon
 - c) Cistron
 - d) Split genes
- 3) The unwinding of DNA during replication is carried out by _____ enzyme.
 - a) DNA Primase
 - b) DNA gyrase
 - c) DNA Ligase
 - d) DNA Helicase
- 4) A base pair substitution mutation in which a codon specifying for one amino acid is substituted by another codon which does not code for any amino acid is called as _____ mutation.
 - a) Missense
 - b) Non sense
 - c) Frame shift
 - d) Neutral
- 5) Insertion of plasmid in the chromosomal DNA of bacteria is called as _____.
 - a) episome
 - b) merosome
 - c) ribosome
 - d) mesosome
- 6) Genetic code is _____ in nature.
 - a) Singlet
 - b) Doublet
 - c) Triplet
 - d) Quadra plate
- 7) The frequency of recombination is more when _____ cell transfers fragment of gene from donor to recipients.
 - a) F⁺
 - b) F'
 - c) F⁻
 - d) HFr
- 8) _____ is base analogue of Thymine.
 - a) 2 Amino purine
 - b) 5-Bromo uracil
 - c) Nitrous acid
 - d) Proflavin

- Q.2 Answer any four of the following. 08**
- a) Define gene.
 - b) What is photoreactivation?
 - c) Define Genotype.
 - d) What is base pair substitution?
 - e) What is competence?
 - f) Enlist the types of plasmids.
- Q.3 Write notes on any two of the following. 08**
- a) Define genetic code. Enlist the properties of genetic code.
 - b) Give a brief account on Watson crick model of DNA.
 - c) Explain in short nucleotide excision repair.
- Q.4 Answer any two of the following. 08**
- a) Describe in detail Avery, Macleod and McCarty experiment to prove DNA as genetic material.
 - b) Discuss in detail induced mutation caused by UV light and alkylating agent.
 - c) Describe in brief specialized transduction.
- Q.5 Answer any one of the following. 08**
- a) Discuss in detail mechanism of DNA replication in prokaryotes.
 - b) Describe in detail mechanism of genetic recombination by conjugation.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper - VII)
Core Java (22221429)

Day & Date: Sunday, 12-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Multiple choice question.

08

- 1) Which one of the following is not a Java feature?
 - a) Object-oriented
 - b) Use of pointers
 - c) Portable
 - d) Dynamic and Extensible
- 2) Which of these operators is used to allocate memory to array variable in Java?
 - a) malloc
 - b) alloc
 - c) new
 - d) new malloc
- 3) Which keyword is used to refer current object of a class in Java?
 - a) this
 - b) new
 - c) current
 - d) None
- 4) try, catch, finally, throw, and throws keywords in java are related to _____.
 - a) Event handling
 - b) string handling
 - c) exception handling
 - d) None of the above
- 5) All Interface methods in Java are _____ by default.
 - a) public
 - b) abstract
 - c) public and abstract
 - d) None of the above
- 6) Which of these are types of multitasking?
 - a) Process based
 - b) Thread based
 - c) both a and b
 - d) None of the mentioned
- 7) What does I/O stand for in Java?
 - a) Input/Output
 - b) Inheritance/Overriding
 - c) Interger/Object
 - d) Iteration/Observation
- 8) Which of these packages contain all the collection classes?
 - a) java.lang
 - b) java.util
 - c) java.net
 - d) java.awt

Q.2 Answer any Four of the following.

08

- 1) Define is constructor.
- 2) What are the types of inheritance?
- 3) What is Encapsulation?
- 4) Define abstract class.
- 5) List out access specifier in java.

Q.3 Answer any TWO of the following.

08

- 1) Write a program which implement ArrayList class implement list interface.
- 2) Explain Jagged array with example.
- 3) Explain data types in java.

Q.4 Answer any TWO of the following.

08

- 1) Explain interface in details.
- 2) Explain Exception handling in java.
- 3) Write a program to implements method overriding.

Q.5 Answer any ONE of the following.

08

- 1) Explain thread life cycle? Write a program for thread priority.
- 2) Write a program to implements 'CallableStatement' interface.

- Q.3 Write short notes on any two of the following. 08**
- a) Heat treatment on steel
 - b) Froth floatation method
 - c) Manufacture of ammonia by Haber's process
- Q.4 Answer any two of the following. 08**
- a) Distinguish between Bessemer process and L.D. process.
 - b) What is metallochromic indicator? Discuss the role of metallochromic indicator.
 - c) Explain role of organic precipitant DMG in gravimetric analysis.
- Q.5 Answer any one of the following. 08**
- a) What is acid-base indicator? Explain the choice of an indicator for titration between strong acid and strong base with help of neutralization curve.
 - b) Define precipitate and precipitant. Explain physical nature of precipitate.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper – VIII)
DBMS Using Oracle (22221430)

Day & Date: Friday, 12-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions.

08

- 1) _____ Operator is used to compare a value to a specified list of values.
 - a) BETWEEN
 - b) ANY
 - c) IN
 - d) ALL
- 2) Which of the following levels deals with the physical representation of the database r?
 - a) External level
 - b) Internal level
 - c) Conceptual level
 - d) None of these
- 3) The person who has the central control over data and application programs is _____.
 - a) DBA
 - b) System analysts
 - c) Database designer
 - d) None of these
- 4) Which of the following is a top-down approach in which the entity's higher level can be divided into two lower sub-entities?
 - a) Aggregation
 - b) Generalization
 - c) Specialization
 - d) All of these
- 5) Which of the following is not a concern of concurrent operations?
 - a) Lost update problem
 - b) Update anomaly
 - c) Unrepeatable read
 - d) Dirty read
- 6) _____ means multiple copies of the same data items.
 - a) Data integrity
 - b) Data consistency
 - c) Data redundancy
 - d) Isolation
- 7) DCL provides commands to perform actions like _____.
 - a) Change the structure of Tables
 - b) Insert, Update or Delete Records and Values
 - c) Authorizing Access and other control over Database
 - d) All of the Above
- 8) Tree structures are used to store data in _____ model.
 - a) Network
 - b) Relational
 - c) Hierarchical
 - d) File based system

- Q.2 Answer any Four of the following. 08**
- a) What is a Package in PL/SQL?
 - b) What are the types of attributes in the ER model?
 - c) What is %type and %rowtype?
 - d) Write a list of Database users.
 - e) Write the use and syntax of the create table statement.
- Q.3 Write short notes on any Two of the following. 08**
- a) Explain Relational model in details.
 - b) Explain shadow paging.
 - c) Explain the properties of transactions.
- Q.4 Answer any Two of the following. 08**
- a) Explain conflict serializability.
 - b) Write difference between Procedures and Functions.
 - c) What are DDL statements? Explain DDL statements with examples.
- Q.5 Answer any One of the following. 08**
- a) Explain timestamp-based protocol with example.
 - b) What is the procedure? Explain parameters in procedures with an example.

- Q.2 Answer any four of the following. 08**
- a) For a coaxial optical system, the initial and final media are water ($n_1 = 1.33$) and air respectively. For a given object the lateral magnification is - 1.5. Calculate:
 - i) the axial and
 - ii) angular magnifications
 - b) State the characteristics of Double refraction.
 - c) Explain specific rotation for solids, liquids and solutions.
 - d) Explain numerical aperture.
 - e) State two advantages of optical fiber.
- Q.3 Answer any two of the following. 08**
- a) Write a note on Nicol Prism.
 - b) Write a note on Fibre Optic communication system.
 - c) With the help of neat ray diagram obtain Newton's formula.
- Q.4 Answer any two of the following. 08**
- a) With the help of neat ray diagram, prove that the principal points coincide with the nodal points when the medium on both sides of the system is same.
 - b) In an experiment light of wavelength 6000\AA is used. The point source of light is kept at a distance of 5 m and the screen is at a distance of 2 m from the straight edge of the obstacle. Calculate the position of the first two minima and their separation.
 - c) Describe polarimeter experiment to determine the specific rotation of an optically active solution.
- Q.5 Answer any one of the following. 08**
- a) With a neat diagram explain the construction of Michelson's interferometer. Explain the function of
 - i) silvering of the beam splitting glass plate and
 - ii) the compensating glass plate
 - b) Derive an expression for the resolving power of a plane diffraction grating. The sodium double having components 5896\AA and 5890\AA . Find the minimum number of lines in a plane diffraction grating which will resolve this doublet in the second order.

Q.4 Answer any two of the following.

08

- a) Write note on transamination and decarboxylation.
- b) Write note on fate of pyruvate.
- c) Write note on oxidative phosphorylation.

Q.5 Answer any one of the following.

08

- a) What is balanced diet? Explain calorific values of food and its measurement.
- b) What are sources of the atoms in the purine molecules? Explain biosynthesis of purines.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
PLANT PROTECTION (Paper - VII)
Introduction to Weed and Non-Insect Pests (22221417)

Day & Date: Monday, 15-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicates full marks.
 4) Use of logarithm table and calculator is allowed.

Q.1 Choose the correct alternatives from the options.

08

- 1) The weed causes _____ losses in crop plants.
 - a) qualitative
 - b) quantitative
 - c) both a and b
 - d) None of these
- 2) The weed is harmful to _____.
 - a) human
 - b) plant
 - c) both a and b
 - d) None of these
- 3) The weed completes their life cycle on living organism is known as _____ weed.
 - a) parasite
 - b) aquatic
 - c) poisonous
 - d) None of these
- 4) The weed develop in water is known as _____ weed.
 - a) poisonous
 - b) aquatic
 - c) parasite
 - d) All of the these
- 5) Classification of weed is based on _____.
 - a) ontogeny
 - b) ecology
 - c) crop association
 - d) All of the these
- 6) Weed dispersal with the help of _____.
 - a) wind
 - b) water
 - c) man
 - d) All of the these
- 7) Example of the stem parasite _____.
 - a) Cuscuta
 - b) Striga
 - c) Loranthus
 - d) None of these
- 8) Example of aquatic weed are _____.
 - a) Hydrilla
 - b) Eichhornia
 - c) Vallisneria
 - d) All of these

Q.2 Answer any four of the following

08

- a) Give the definition of poisonous weed.
- b) What is weed?
- c) Give the definition of parasite weed.
- d) Define reproduction.
- e) What is management?
- f) Write the definition of Ontogeny.

- Q.3 Write short notes on any two of the following** **08**
- a) Crop rotation
 - b) Ploughing
 - c) Field sanitization
- Q.4 Answer any two of the following.** **08**
- a) Explain the classification of weed based on ecology.
 - b) Explain the gross morphology and reproduction of *Argemone maxicana*.
 - c) Give the 2,4-D studied by you.
- Q.5 Answer any one of the following.** **08**
- a) Write the *Euphorbia hirta* with respect to gross morphology, reproduction, dispersal and management of weed.
 - b) Explain the birds with respect to nature of damage, losses and management.

Q.3 Answer any two of the following.**08**

- a) Write note on LS coupling.
- b) Obtain Bohr's quantum condition on the basis of matter waves.
- c) Calculate the Compton wavelength with given details.

(Given: $h = 6.63 \times 10^{-34}$ J.Sec

$$m_0 = 9.1 \times 10^{-31} \text{ Kg}$$

$$c = 3 \times 10^8 \text{ m/s})$$

Q.4 Answer any two of the following.**08**

- a) Derive Einstein's mass energy relation.
- b) Describe Coolidge tube for production of X-rays.
- c) Describe experimental verification of Compton Scattering.

Q.5 Answer any one of the following.**08**

- a) Explain Michelson-Morley experiment and obtain the equation for fringe width.
- b) Explain in detail the Normal Zeeman Effect experiment.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
BIO-CHEMISTRY (Paper - IV)
Molecular Biochemistry & Diseases (22221409)

Day & Date: Thursday, 18-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.

Q.1 Multiple choice questions.**08**

- 1) Insulin promotes _____.
 - a) glucosuria
 - b) glycogenesis
 - c) glycogenolysis
 - d) gluconeogenesis
- 2) Pinocytosis actually means _____.
 - a) cell mitosis
 - b) cell-eating
 - c) cell-drinking
 - d) cell respiration
- 3) Anti aids drug is _____.
 - a) metformin
 - b) tolbutamide
 - c) didanosine
 - d) crocin
- 4) A plasmid vector contains _____ elements.
 - a) 1
 - b) 2
 - c) 3
 - d) 4
- 5) Synthesis of insulin begins at _____.
 - a) rRER
 - b) sRER
 - c) mitochondria
 - d) nucleolus
- 6) The genetic material of AIDS virus is _____.
 - a) single stranded DNA
 - b) single stranded RNA
 - c) double stranded DNA
 - d) double stranded RNA
- 7) _____ enzyme is responsible for making a DNA copy from RNA.
 - a) DNA polymerase
 - b) RNA poll
 - c) RNAPolIII
 - d) reverse transcriptase
- 8) Enzymes are made up of _____.
 - a) Fats
 - b) Proteins
 - c) nucleic acids
 - d) Vitamins

Q.2 Answer any four of the following.**08**

- a) Which cells involved in immune response.
- b) What is reverse transcriptase?
- c) Define enzyme activity and specific activity.
- d) Write Natural & acquired immunity.
- e) What is inducible genes?

- Q.3 Write short notes on any Two of the following. 08**
- a) Write note on Restriction endonucleases.
 - b) Explain Structure of HIV.
 - c) Write derivation of Michaelis-Menten equation for single substrate.
- Q.4 Answer any Two of the following. 08**
- a) Write types and properties of antibodies.
 - b) Explain Lock & key model.
 - c) Which are the types of diabetes mellitus?
- Q.5 Answer any One of the following. 08**
- a) Explain replication of DNA and transcription in prokaryotes.
 - b) Explain metabolic effects of insulin and mechanism of action of insulin.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
PLANT PROTECTION (Paper - VIII)
Insect Pests and Their Management (22221418)

Day & Date: Thursday, 18-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions.**08**

- 1) The life cycle of Insect is divided into _____ stages.
 - a) five
 - b) two
 - c) three
 - d) four
- 2) _____ is the common Pest of Rose.
 - a) White grub
 - b) Jassid
 - c) Woolly aphid
 - d) Thrip
- 3) A chemical which induces insects to move away from it is called _____.
 - a) Pheromone
 - b) Antifeedant
 - c) Repellent
 - d) Attractant
- 4) _____ is the pest of stored grains.
 - a) Jassid
 - b) Stem borer
 - c) Rice weevil
 - d) Pod borer
- 5) Red spider is the pest of _____.
 - a) Tomato
 - b) Gram
 - c) Sugarcane
 - d) Mango
- 6) Azadirachtin is obtained from _____ plant.
 - a) Tobacco
 - b) Neem
 - c) Karanj
 - d) Cotton
- 7) Jassid is the pest of _____.
 - a) Mango
 - b) Brinjal
 - c) Gram
 - d) Jowar
- 8) _____ is the most serious pest of Gram.
 - a) Pod borer
 - b) Fruit borer
 - c) Stem borer
 - d) Thrip

Q.2 Answer any Four of the following.**08**

- a) Write the host range of stem borer.
- b) Explain antifeedants.
- c) Write the marks of identification of pod borer.
- d) Explain microbial insecticides.
- e) Write the management of woolly aphid.

- Q.3 Write short notes on any Two of the following. 08**
- a) Life cycle of white grub
 - b) Classification of insects based on mouth parts
 - c) Principles of insect pest control
- Q.4 Answer any Two of the following. 08**
- a) Write the general characters of typical insect w.r.t. wings, types of legs and abdomen.
 - b) Describe plant origin insecticides.
 - c) Explain host range, nature of damage and management of fruit borer.
- Q.5 Answer any One of the following. 08**
- a) Describe the classification of insecticides based upon mode of entry and mode of action.
 - b) Give an account of jowar stem borer w.r.t. scientific name, marks of identification and life cycle.

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**B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
STATISTICS (Paper - VII)**

Continuous Probability Distributions (22221411)

Day & Date: Friday, 19-04-2024
Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagrams and give equations whenever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 Choose the correct alternative:

08

- 1) If $X \sim N(\mu, \sigma^2)$, then _____.
 - a) Mean = Median = Mode
 - b) Mean > Median > Mode
 - c) Mean < Median < Mode
 - d) None of these
- 2) If $X \sim U[2,4]$, then $E(X)$ is _____.
 - a) 2
 - b) 3
 - c) 4
 - d) 0
- 3) If $X \sim \beta_I(m, n)$ distribution, then $1 - X$ has _____ distribution.
 - a) $\beta_{II}(m, n)$
 - b) $\beta_I(n, m)$
 - c) $\beta_{II}(n, m)$
 - d) None of these
- 4) If $X \sim G(4, 3)$ then distribution of $2X$ is _____.
 - a) $G(2, 3)$
 - b) $\exp(2)$
 - c) $G(4, 3/2)$
 - d) $G(4, 2)$
- 5) If X has chi-square variate with n d. f. then $\text{Var}(X)$ is _____.
 - a) n
 - b) $2n$
 - c) 1
 - d) 2
- 6) If $t \sim t_n$ then distribution of t^2 is _____ distribution.
 - a) $F_{1,n}$
 - b) $F_{n1,n2}$
 - c) t_n
 - d) None of these
- 7) Let the r. v. X have exponential distribution with parameter $1/\theta$, then mean of X is _____.
 - a) θ^2
 - b) θ
 - c) $1/\theta$
 - d) $1/\theta^2$
- 8) If X_i 's are independent $N(0,1)$ r. v. then distribution of $\sum_{i=1}^n X_i^2$ is _____.
 - a) Chi-square with 1 d. f.
 - b) Chi-square with n d. f.
 - c) Normal distribution
 - d) None of these

Q.2 Answer any four of the following.

08

- a) State mean and variance of $G(\alpha, \lambda)$ distribution.
- b) State any two properties of Normal Distribution.
- c) Write definition of Snedecor's F- distribution.
- d) Find mean of $U[a, b]$ distribution.
- e) State m.g.f. of $N(\mu, \sigma^2)$ distribution.

- Q.3 Answer any two of the following.** **08**
- a) Let $X \sim N(\mu, \sigma^2)$ distribution, then find distribution of $Y = aX + b$.
 - b) Find harmonic mean of beta distribution of second kind.
 - c) State and prove lack of memory property of exponential distribution.
- Q.4 Answer any two of the following.** **08**
- a) Find mode of chi-square variate with n d.f.
 - b) If $X \sim \beta_1(\mathbf{m}, \mathbf{n})$ then find $E(X)$.
 - c) Find m.g.f. of $\exp(\theta)$ distribution.
- Q.5 Answer any one of the following.** **08**
- a) Derive the pdf of chi-square variate with n d.f.
 - b) If $X \sim (\alpha, \lambda_1)$ and $Y \sim G(\alpha, \lambda_2)$ and X & Y are independent variates then find distribution of $\frac{X}{X+Y}$

Seat
No.

B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
METEOROLOGY (Paper – III)
Applied Climatology (22221438)

Day & Date: Saturday, 20-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams wherever necessary.
 4) Use of stencils is allowed.

Q.1 Choose the correct alternative.**08**

- 1) The term 'forecast' was first applied in meteorology by _____.
 a) Miller
 b) Fitzroy
 c) Coriolis
 d) Trewartha
- 2) When the isobars are widely spaced the pressure gradient is _____.
 a) Gentle
 b) moderate
 c) steep
 d) vertical
- 3) Medium range forecast up to _____ days.
 a) 3 to 21
 b) 3 to 26
 c) 3 to 48
 d) 3 to 72
- 4) Statistical methods are used for _____ range forecasting of weather.
 a) Hourly
 b) medium
 c) long
 d) daily
- 5) In a hot dry environment excessive sweating causes _____.
 a) Breathing
 b) dehydration
 c) sweating
 d) shivering
- 6) The primary purpose of clothing is to protect man against _____ and improve his physiological comfort.
 a) humidity
 b) temperature
 c) wind
 d) weather
- 7) The Coriolis force is _____ in high latitude.
 a) Absent
 b) strong
 c) strongest
 d) None of these
- 8) _____ is irregular motion of air over short distance in the atmosphere.
 a) Anticyclone
 b) Turbulence
 c) Cyclone
 d) Circulation

Q.2 Answer any four of the following.**08**

- a) What is heat island?
- b) What are rotational forces?
- c) Coriolis effect.
- d) Define offshore drilling.
- e) Human body comfort

- Q.3 Write short notes on any two of the following. 08**
- a) Urban climate
 - b) Climate and industry
 - c) Atmospheric pressure
- Q.4 Answer any two of the following. 08**
- a) Explain the importance of pressure gradient in atmosphere.
 - b) Write the effect of urban climatic on body comfort.
 - c) Write on historical background of weather forecasting studies.
- Q.5 Answer any one of the following. 08**
- a) Describe the importance of industrial activities.
 - b) Explain the method of weather forecasting.

- Q.3 Write short notes on any two of the following. 08**
- a) Explain strontium as a stable isotope.
 - b) Write note on temperature changes in acids and bases.
 - c) Explain Isotope geochemistry.
- Q.4 Answer any two of the following questions. 08**
- a) Explain estimation of ionic concentration.
 - b) Write note on radioactive isotopes.
 - c) Write geological usages of acids and bases.
- Q.5 Answer any one of the following. 08**
- a) What is law of mass action? Explain Van't Hoff isotherm equation.
 - b) What is organic reaction? Explain origin of petroleum.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper – VII)
Fundamentals of Biochemistry (22221432)

Day & Date: Saturday, 20-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams wherever necessary.

Q.1 Multiple choice Questions. 08

- 1) The simple carbohydrates containing single monomeric unit is called as _____.
 a) Monosaccharide b) Disaccharides
 c) Oligosaccharides d) Polysaccharides
- 2) _____ is left handed DNA where the double helix winds to the left in zig zag manner.
 a) A DNA b) B DNA
 c) C DNA d) Z DNA
- 3) Nucleotides' are organic molecules consisting of a nucleosides and a _____.
 a) Glutamate b) Aspartate
 c) Purines d) Phosphate
- 4) The most common secondary structure of proteins are _____.
 a) Alpha helix and Beta sheet b) Okazaki fragments
 c) FC region d) Fab region
- 5) Which of these is not a amino acid?
 a) Lysine b) Isomeric
 c) Tyrosine d) Tryptophan
- 6) Name the major storage form carbohydrates in animal _____.
 a) Cellulose b) Chitin
 c) Glycogen d) Starch
- 7) All enzymes molecules contain a special cleft or pocket in its structure which is actively involved in catalysis. This cleft or pockets is known as _____.
 a) Passive site b) Allosteric site
 c) Active site d) Capsomer
- 8) _____ is a type of RNA molecule that helps decode a mRNA sequence in to protein.
 a) m RNA b) t RNA
 c) r RNA d) r RNA Polymerase

Q.2 Answer any four of the following. 08

- a) Significance of O₂
- b) Disaccharide
- c) Nitrogen bases
- d) r RNA
- e) Vitamin C

- Q.3 Write short notes on any two of the following. 08**
- a) Explain Isoenzyme.
 - b) Biological significance of lipid.
 - c) Describe general properties of Alpha- amino acid.
- Q.4 Answer any two of the following. 08**
- a) Explain r RNA and t RNA.
 - b) Describe saturated and unsaturated fatty acids.
 - c) Explain properties of enzymes.
- Q.5 Answer any one of the following. 08**
- a) Describe structure of DNA and give its significance.
 - b) What are the different types of vitamins?

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
STATISTICS (Paper – VIII)
Statistical Methods – II (22221412)

Day & Date: Monday, 22-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 choose the correct alternative:**08**

- 1) A random variable X has mean 3 and variance 2. Then the upper bound for $P[|X - 3| \geq 2]$ is _____.
 - a) 1
 - b) $\frac{3}{4}$
 - c) $\frac{1}{4}$
 - d) $\frac{1}{2}$
- 2) If X_i are iid $N(0,1)$ r.vs, then limiting distribution of $Z = \underline{\hspace{2cm}}$ is $N(0,1)$.
 - a) \bar{X}
 - b) $\frac{\bar{X}}{\sqrt{n}}$
 - c) $\bar{X}\sqrt{n}$
 - d) $\bar{X} + \sqrt{n}$
- 3) Long term fluctuations in time series are called _____ variations.
 - a) seasonal
 - b) cyclical
 - c) trend
 - d) irregular
- 4) Moving averages remove cyclic variations if _____.
 - a) period is 5
 - b) period is 9
 - c) period is same as that of cycle
 - d) period is 2
- 5) Level of significance is the probability of _____.
 - a) Type I error
 - b) Type II error
 - c) Not committing error
 - d) None of these
- 6) Type - II error is _____.
 - a) Rejecting H_0 when H_0 is wrong
 - b) Rejecting H_0 when H_0 is true
 - c) Accepting H_0 when H_0 is wrong
 - d) Accepting H_0 when H_0 is true
- 7) A hypothesis may be classified are as _____.
 - a) Simple
 - b) Composite
 - c) Null
 - d) All of these
- 8) For testing a population variance which of the following test to be used?
 - a) Z- test
 - b) t- test
 - c) Chi-square test
 - d) F- test

- Q.2 Answer any Four of the following.** **08**
- a) State Chebycheve's Inequality.
 - b) State central limit theorem.
 - c) Define time series.
 - d) Define Null hypothesis.
 - e) Define Type-II error
- Q.3 Answer any Two of the following.** **08**
- a) An unbiased coin is tossed 100 times. Then find the lower bound for the probability that the number of heads will be between 30 and 70.
 - b) Discuss any two components of time series.
 - c) Describe the procedure to test for testing population mean $\mu = \mu_0$ based on t-distribution.
- Q.4 Answer any Two of the following.** **08**
- a) Explain in detail the meaning of time series analysis.
 - b) Suppose X_i are iid $P(1)$ r.vs. $i = 1, 2, \dots, 100$. Then using CLT obtain approximately $P[\sum X_i > 120]$. [$\Phi(2) = 0.9772$]
 - c) Explain the test procedure for testing the goodness of fit.
- Q.5 Answer any One of the following.** **08**
- a) Discuss the importance and utility of time series analysis in various fields.
 - b) Describe the procedure for testing $H_0 : \mu = \mu_0$ and $H_0 : \mu_1 = \mu_2$ based on normal distribution.

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**B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
METEOROLOGY (Paper – IV)
Meteorological Instruments (22221439)**

Day & Date: Tuesday, 23-04-2024
Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice question.

08

- 1) Which of the following is not the form of precipitation?
 - a) Rain
 - b) Dew
 - c) Hailstones
 - d) Condensation
- 2) Which of the following formula is incorrect?
 - a) Atmospheric pressure: $P = -\rho gz$
 - b) pressure gradient = $\frac{dP}{dz}$
 - c) velocity gradient = $\frac{dV}{dt}$
 - d) temperature gradient = $\frac{dT}{dt}$
- 3) Which of the following statement is incorrect?
 - a) a torque produces pure motion of rotation.
 - b) a torque produces pure motion of translation.
 - c) force is an entity which brings a body at rest in motion
 - d) force is an entity which brings a body in motion at rest
- 4) Which of the following instrument works on pressure exerted by the wind?
 - a) Hooks anemometer
 - b) cup anemometer
 - c) Thermograph
 - d) both Hooks anemometer and cup anemometer
- 5) Heat stored in water vapor is _____.
 - a) Specific heat
 - b) Latent heat
 - c) Absolute heat
 - d) Relative heat
- 6) Dry and wet bulb thermometer is used to measure _____.
 - a) Absolute humidity
 - b) atmospheric temperature
 - c) relative humidity
 - d) minimum -maximum temperature
- 7) Which of the following instrument is used to detect the radiations?
 - a) Anemometer
 - b) Wind vane
 - c) Crooke's radiometer
 - d) Radiation pyrometer
- 8) _____ can be used to measure temperature.
 - a) Humidity
 - b) Moisture
 - c) Radiations
 - d) Thermocouple

- Q.2 Answer any Four of the following.** **08**
- a) Determine the common temperature shown by kelvin scale (K) and Rankin (Ra) scale.
 - b) How is atmospheric pressure measured using Fortin's barometer?
 - c) Distinguish between wind vane and anemometer.
 - d) Why winds blow?
 - e) For a $Fe - Cu$ thermocouple, inversion temperature is $500\text{ }^{\circ}C$. Calculate its neutral temperature.
- Q.3 Write short notes on any Two of the following.** **08**
- a) Write a note on "The float gauge."
 - b) Write a short note on the ordinary wind vane.
 - c) Write a note on Ether thermoscope.
- Q.4 Answer any Two of the following.** **08**
- a) Draw neat labelled diagram of mercury barometer.
 - b) With neat diagram explain construction and working of cup anemometer.
 - c) Describe construction and working of radiation pyrometer.
- Q.5 Answer any One of the following.** **08**
- a) Willi neat labelled diagram, describe maximum and minimum thermometer.
 - b) With neat labelled diagram explain construction and working of barograph.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
GEO-CHEMISTRY (Paper – IV)
Chemistry of The Earth (22221442)

Day & Date: Tuesday, 23-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N= 14, Na =23, Cl = 35.5)

Q.1 Multiple choice questions.

08

- 1) _____ mineral has an Si:Al ratio about 2:1, form in neutral or slightly alkaline environment from ferromagnesium, calcic feldspar minerals and especially volcanic ash.
 - a) Kaolinite
 - b) Illite
 - c) Montmorillonite
 - d) Chlorite
- 2) The radioactive decay of unstable nuclides, which causes variation in the isotopic composition of the daughter products.
 - a) Stable isotope
 - b) Isotopes
 - c) Radiogenic isotopes
 - d) None of the above
- 3) Sedimentation involves an interaction between _____.
 - a) Hydrosphere and Lithosphere
 - b) Atmosphere and Lithosphere
 - c) Hydrosphere and Atmosphere
 - d) Hydrosphere, Atmosphere and Lithosphere
- 4) Soil whose dimensions are between _____ mm is silty soil.
 - a) 2 and 0.2,
 - b) 0.2 and 0.02,
 - c) 0.02 and 0.002,
 - d) < 0.002
- 5) Smoke, fumes, ash, dust, nitric oxide and sulphur dioxide are the main sources of _____.
 - a) Primary Pollutants
 - b) Secondary pollutants
 - c) Bio-Degradable Pollutants
 - d) None of the above
- 6) Which one of the following meteorite is known as siderites?
 - a) Iron meteorites
 - b) Iron-stony meteorites
 - c) Stony meteorites
 - d) Metallic meteorites
- 7) _____ bonding is the force of attraction between valence electrons and the metal atoms.
 - a) Ionic
 - b) Covalent
 - c) Metallic
 - d) Hydrogen
- 8) According to the cosmic abundance which of the following element is abundant _____.
 - a) Iron
 - b) Carbon
 - c) Silicon
 - d) Hydrogen

- Q.2 Answer any Four of the following.** **08**
- a) Name the two types of Aerolite.
 - b) What is the composition of chondrites.
 - c) Define radiogenic isotopes.
 - d) Name the factors affecting the formation of Soil.
 - e) Name the trace elements of igneous rock.
 - f) Which element having affinity towards metallic iron?
- Q.3 Write short notes on any Two of the following.** **08**
- a) Geochemical cycle.
 - b) Silicate structure.
 - c) Carbon dating method.
- Q.4 Answer any Two of the following.** **08**
- a) Describe the types of chemical bonding with suitable examples.
 - b) Explain in brief geochemical classification of the elements.
 - c) Discuss in brief the products of sedimentation.
- Q.5 Answer any one of the following.** **08**
- a) Describe in the origin, structure and classification of clay minerals with suitable diagram.
 - b) Define colloids. Explain the its types and colloidal processes in the geological system.

Seat
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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Paper – VIII)
Physiology Control & Coordination (22221433)

Day & Date: Tuesday, 23-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions.**08**

- 1) Function of HCL in the stomach is to _____.
 a) Kill microbes
 b) Dissolve enzyme
 c) Activate pepsinogen into pepsin
 d) Increase absorption
- 2) _____ muscle is attached to various bones.
 a) Smooth
 b) Striated
 c) Cardiac
 d) None of these
- 3) _____ is structural and functional unit of kidney.
 a) Seminiferous tubule
 b) Nephron
 c) Neron
 d) Duct of Bertini
- 4) The blood cell which shows phagocytosis is _____.
 a) Monocyte
 b) Platelet
 c) Eosinophil
 d) Basophil
- 5) Hyposecretion of thyroxine in children causes _____.
 a) Acromegaly
 b) Cretinism
 c) Gigiantism
 d) Goiter
- 6) _____ hormone stimulate the development of seminiferous tubules and spermatogenesis.
 a) FSH
 b) LH
 c) GH
 d) MSH
- 7) Adrenal cortex secretes _____.
 a) Adrenaline
 b) Calcitonin
 c) Aldosterone
 d) Epinephrine
- 8) Growth hormone stimulate the growth of _____.
 a) Bones
 b) Cartilage
 c) Muscles
 d) All of the above

Q.2 Answer any Four of the following.**08**

- a) V.S.Tooth
- b) Parturition
- c) Synapse
- d) Graffian follicle
- e) Epithelial tissue

- Q.3 Write short notes on any Two of the following. 08**
- a) Types of blood cells.
 - b) Ultra structure of skeletal muscle.
 - c) Pancreas.
- Q.4 Answer any Two of the following. 08**
- a) T.S.Testis
 - b) Ultrastructure of neuron.
 - c) technique of IVF.
- Q.5 Answer any one of the following. 08**
- a) Describe Molecular and chemical basis of muscle contraction.
 - b) Explain Menstrual cycle.

Seat
No.

B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper - VII)
Differential Equations (22221423)

Day & Date: Wednesday, 24-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Choose the correct alternative for each of the following.**08**

- 1) The equation $y = px + f(p)$ is called _____ equation.
 - a) Linear
 - b) Bernoulli's
 - c) Clairaut's
 - d) De-Poivrey
- 2) The solution of $P(P - 1) = 0$ is _____.
 - a) $(y - c)(y - x - c)$
 - b) $(y - c)(x - c)$
 - c) $(y - c)(y + x + c)$
 - d) $(y + c)(x + c)$
- 3) If $P + Qx = 0$ then the solution of the equation $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = 0$ is _____.
 - a) $y = e^x$
 - b) $y = e^{-x}$
 - c) $y = e^{2x}$
 - d) $y = x$
- 4) $y = e^{-x}$ is known solution of C.F. of the differential equation $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + QY = R$ if _____.
 - a) $1 + Px + Qx^2 = 0$
 - b) $1 + P + Q = 0$
 - c) $1 - P + Q = 0$
 - d) $1 + P - Q = 0$
- 5) The homogeneous linear equation can be reduced to linear equation with constant coefficients by using substitution _____.
 - a) $x = \log z$
 - b) $x = e^z$
 - c) $x = \frac{1}{z}$
 - d) $x = z^2$
- 6) By using substitution $x = e^z$ the value of $x^2 \frac{d^2y}{dx^2}$ in the homogenous linear equation is _____.
 - a) D^2y
 - b) $D(D + 1)y$
 - c) $D(D - 1)y$
 - d) $(D - 1)(D - 2)y$
- 7) In the simultaneous equation $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ the value of P, Q, R are _____.
 - a) constant
 - b) function of x only
 - c) function of x & y
 - d) function of x, y, z
- 8) If the condition of integrability is satisfied then the solution of the equation $y dx + x dy + 2z dz = 0$ is _____.
 - a) $xy + z = c$
 - b) $xy + z^2 = c$
 - c) $xy + 2z^2 = c$
 - d) $xy + z^3 = c$

Q.2 Answer any four of the following.

08

- Solve $P = \log(px - y)$
- Solve $(P + 4)(P - 3) = 0$
- State the geometric Interpretation of $Pdx + Qdy + Rdz = 0$
- Solve $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$
- Solve $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = 0$

Q.3 Answer any two of the following.

08

- Define homogeneous linear differential equation of order n . Explain the method of solving it.
- Define Clairaut's equation and Explain the method of solving it.
- Solve $x^2 \frac{d^2y}{dx^2} - z(x^2 + x) \frac{dy}{dx} + (x^2 + 2x + 2)y = 0$

Q.4 Answer any two of the following.

08

- Solve $yz dx + zx dy + xy dz = 0$
- Solve $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} - y = 2 \log(x + 1)$
- Explain the method of solving the equation $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ where P, Q, R are function of x by removal of the first order derivative by changing the dependent variable.

Q.5 Answer any One of the following.

08

- Explain the method of solving simultaneous differential equation $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ and Solve $\frac{dx}{z} = \frac{dy}{z} = \frac{dz}{z^2 + (x+y)^2}$
- Explain the method of solving the equation which is solvable for y and hence. Solve $y = 2px + x^2p^4$

Seat No.	
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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
BOTANY (Paper – VII)
Plant Physiology (22221402)

Day & Date: Thursday, 25-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat and labeled diagram wherever necessary.

Q.1 Multiple choice questions.

08

- 1) The phytochrome exists in _____ forms.
 - a) Pr
 - b) Pfr
 - c) Pr & Pfr
 - d) None of these
- 2) _____ is the short-day plant.
 - a) Tobacco
 - b) Barley
 - c) Coconut
 - d) Pea
- 3) The translocation of organic substances occurs through _____ tissue.
 - a) xylem
 - b) phloem
 - c) tracheid
 - d) vessel
- 4) The _____ region supplies the organic substance for translocations.
 - a) source
 - b) sink
 - c) utilization
 - d) None of these
- 5) In photosynthesis, solar energy is converted into _____.
 - a) Heat energy
 - b) solar energy
 - c) chemical energy
 - d) None of these
- 6) Initial stable product in C₄ pathway is _____.
 - a) PGA
 - b) PGAL
 - c) OAA
 - d) Malic acid
- 7) Photorespiration is characteristic of _____.
 - a) C₃ plants
 - b) C₄ plants
 - c) CAM plants
 - d) None of the above
- 8) Light reactions are required for the synthesis of an _____.
 - a) Reducing power
 - b) assimilatory power
 - c) energy
 - d) ADP

Q.2 Answer any Four of the following.

08

- a) Define photoperiodism.
- b) What is phytochrome
- c) What is phloem transport?
- d) Define Photosynthesis
- e) What is photorespiration?

- Q.3 Write short notes on any Two of following. 08**
- a) Photosynthetic Pigments
 - b) Structure of Mitochondria
 - c) Significance of vernalization
- Q.4 Answer any Two of the following. 08**
- a) Describe in brief SDP and LDP.
 - b) Describe ultrastructure of Photosynthetic Apparatus with suitable diagram.
 - c) Describe in brief TCA cycle.
- Q.5 Answer any One of the following. 08**
- a) What is respiration? Give an account of Glycolysis.
 - b) Give an account of C₃ pathway.

Seat
No.

B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper - VIII)
Abstract Algebra - I (22221424)

Day & Date: Friday, 26-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Choose correct alternatives for each of the following.**08**

- 1) The symmetric group S_5 has _____ elements.
 - a) 5
 - b) 30
 - c) 120
 - d) 60
- 2) $(Z, -)$ is not a group since it does not satisfy following property _____.
 - a) Closed
 - b) Associative
 - c) Identity
 - d) Inverse
- 3) Let $f: G \rightarrow G'$ be homomorphism then $\ker f =$ _____.
 - a) $\{x \in G / f(x) = e'\}$
 - b) $\{x \in G / f(x) = e\}$
 - c) $\{x \in G' / f(x) = e\}$
 - d) $\{x \in G' / f(x) = x\}$
- 4) A cyclic group is always _____.
 - a) A finite group
 - b) An abelian group
 - c) An infinite group
 - d) A non abelian group
- 5) The number of generators of the group Z_{12} is _____.
 - a) 1
 - b) 2
 - c) 4
 - d) 11
- 6) The value of expression $[2] \odot [4]$ in Z_7 is _____.
 - a) [1]
 - b) [2]
 - c) [3]
 - d) [4]
- 7) A relation ' \sim ' on set s defined by $a \sim b \Rightarrow b \sim a \forall a, b \in s$ is called _____.
 - a) Reflexive
 - b) Symmetric
 - c) Transitive
 - d) None of these
- 8) The Euler ϕ function, $\phi(8) =$ _____.
 - a) 8
 - b) 4
 - c) 1
 - d) 0

Q.2 Attempt any four of the following:**08**

- a) Show that the inverse of each element of a group G is unique.
- b) If $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 3 & 2 \end{pmatrix}$, $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$ the find $\alpha \circ \beta$ & $\beta \circ \alpha$.
- c) Solve the equation $x(1\ 3\ 2) = (1\ 3)$ in S_3 .
- d) Construct the Cayley table for Z_5
- e) Let $\theta: R^+ \rightarrow R$ be defined by $\theta(x) = \log x$ then show that θ is homomorphism.

- Q.3 Attempt any two of the following.** **08**
- a) State and prove Lagrange's theorem.
- b) For permutation $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 5 & 6 & 4 & 2 & 1 \end{pmatrix}$ $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 1 & 6 & 4 & 5 & 3 & 2 \end{pmatrix}$
Compute $\beta \circ \alpha, \alpha^{-1} \circ \beta^{-1}, \alpha^2 \beta, \alpha \beta^2$
- c) Show that every subgroup of cyclic group is cyclic.
- Q.4 Attempt any two of the following.** **08**
- a) Show that every quotient group of abelian group is abelian. What about converse?
- b) Find all the subgroup of Z_{12} . Also construct the subgroup lattice.
- c) Determine the right coset of $\langle [4] \rangle$ in Z_{12} .
- Q.5 Attempt any one of the following.** **08**
- a) State and prove Cayley's theorem.
- b) Find g.c.d. of 31 and 13 and express $(31, 13) = 31x + 13y$

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**B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
BOTANY (Paper – VIII)**

Embryology of Angiosperms (22221403)

Day & Date: Saturday, 27-04-2024
Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.

Q.1 Choose the correct alternatives from the options.

08

- 1) _____ floral whorled flower is called typical flower.
 - a) Two
 - b) Three
 - c) Four
 - d) Five
- 2) The sporangial initial cell is called as _____.
 - a) Archisporial cell
 - b) Antipodal cell
 - c) Secondary nucleus
 - d) Peripheral cell
- 3) Endosperm in angiosperm have _____ set of chromosomes.
 - a) One
 - b) Two
 - c) Three
 - d) Four
- 4) The entry of pollen tube in ovule through integument, is known as _____.
 - a) Chalazogamy
 - b) Mesogamy
 - c) Porogamy
 - d) None of these
- 5) _____ is the most common nutritive tissue for the developing embryos in angiosperms.
 - a) Endosperm
 - b) Tapetum
 - c) Promeristem
 - d) None of these
- 6) _____ type of endosperms is supposed to be rare.
 - a) Helobial
 - b) Cellular
 - c) Nuclear
 - d) None of these
- 7) _____ acts as shock absorbance in coconut fruit during dispersal.
 - a) Epicarp
 - b) Mesocarp
 - c) Endocarp
 - d) None of these
- 8) _____ seeds are exalbuminous seeds.
 - a) Monocot
 - b) Dicot
 - c) Both a & b
 - d) None of these

Q.2 Answers any Four of the following.

08

- a) What is mean by primordia?
- b) Define archesporium.
- c) What is mean by Autogamy?
- d) What is mean by endospermic seeds?
- e) Give the examples of non-endospermic seeds.

- Q.3 Write short notes on any Two of the following. 08**
- a) Self-seed dispersal mechanism in plants.
 - b) Bisporic embryo sac development with neat, labeled diagrams.
 - c) Flower as a modified determinate shoot and evidence.
- Q.4 Answers any Two of the following. 08**
- a) Give the functions of tapetum.
 - b) Write on agents of pollination.
 - c) Describe pollination mechanism in *Maize*.
- Q.5 Answers any One of the following. 08**
- a) Describe the development of female gametophyte with diagrams.
 - b) Describe the embryo development in dicotyledons.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
GEOGRAPHY (Paper – VII)
Economic Geography (22221435)

Day & Date: Monday, 29-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.

Q.1 Multiple choice questions.

08

- 1) Economic Geography is a branch of _____ Geography.
 - a) Cultural
 - b) Social
 - c) Political
 - d) Human
- 2) The word 'agriculture' (Agricoltura) derived from the _____ language.
 - a) Arabian
 - b) Latin
 - c) Roman
 - d) Greek
- 3) Agriculture Land use model by Von Thunes has given in _____.
 - a) 1726
 - b) 1826
 - c) 1926
 - d) 1996
- 4) Transport is a _____ type of economic activity.
 - a) Primary
 - b) Secondary
 - c) Tertiary
 - d) Quaternary
- 5) Industrial location theory has given by _____.
 - a) A. Wagner's
 - b) A. Weber's
 - c) Von Thunes
 - d) Carl Ritter
- 6) Trade is _____ types of occupation.
 - a) Primary
 - b) Secondary
 - c) Tertiary
 - d) Quaternary
- 7) SEZ is a _____.
 - a) Special Economic Zones
 - b) Spatial Economic Zones
 - c) Special Ecological Zones
 - d) Special Economic Zoo
- 8) _____ is a primary types of economic activities.
 - a) Acting
 - b) Mining
 - c) Manufacturing
 - d) Transportation

Q.2 Answer any Four the following.

08

- a) Define the concept of Mining.
- b) Define the concept Sustainable agriculture.
- c) Define the Technology Park.
- d) Define the concept of manufacturing region.
- e) Define the concept of Trade.

- Q.3 Write short note on any Two of the following. 08**
- a) Primary economic activities.
 - b) Commercial agriculture.
 - c) Iron and steel industries.
- Q.4 Answer any Two of the following. 08**
- a) Explain the types of Tertiary economic activities.
 - b) Explain the Industrial Location Theory by Alfred Weber.
 - c) Explain the major characteristics of Secondary economic activities.
- Q.5 Answer any One of the following. 08**
- a) Explain the Agriculture Landuse Model by Von Thunes.
 - b) Explain the trade organization of WTO and OPEC.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper – VII)
Operational Amplifier and Applications (22221426)

Day & Date: Monday, 29-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.

Q.1 Multiple choice questions.

08

- 1) The _____ configuration of OpAmp offers gain less than one.
 - a) inverting
 - b) differential
 - c) non-inverting
 - d) both inverting & differential
- 2) In an integrator circuit using inverting configuration of OpAmp, the capacitor is connected _____ path.
 - a) in feedback
 - b) at the inverting terminal
 - c) at the non-inverting terminal
 - d) in designer chosen
- 3) The bandwidth of open loop configuration of OpAmp circuits is _____.
 - a) almost zero
 - b) in audio frequency range
 - c) almost infinity
 - d) in radio frequency range
- 4) To construct zero crossing detector using non inverting configuration of OpAmp, the reference voltage is _____.
 - a) +zero Volt
 - b) - zero Volt
 - c) zero Volt
 - d) All of these
- 5) The _____ parameter normally decides the speed of OpAmp in differential configuration.
 - a) slew rate
 - b) PSRR
 - c) CMRR
 - d) offset voltage
- 6) In case of closed loop OpAmp inverting amplifier, input voltage is 4 mV, input resistance is 5 KOhm and feedback resistance is 25 KOhm then the out voltage is _____.
 - a) + 20 mV
 - b) - 20 mV
 - c) - 5 mV
 - d) + 5 mV
- 7) The _____ of IC 741 are utilized for offset null procedure.
 - a) pin 2 and Vcc
 - b) pin 2 and 3
 - c) pin 1 and 5
 - d) pin 3 and Vcc
- 8) In case of Op-Amp, V to I converter circuit is _____ amplifier.
 - a) transconductance
 - b) transresistance
 - c) conductance
 - d) buffer

- Q.2 Answer any Four the following.** **08**
- a) State any four OpAmp 741 characteristics.
 - b) State the need of feedback in OpAmp.
 - c) Draw the neat labelled IC741 pin configuration.
 - d) Find the CMRR in dB, if A_d is 10000 and A_c is 0.70.
 - e) Define the OpAmp parameter slew rate and input offset voltage.
 - f) State any two linear application of OpAmp.
- Q.3 Answer any Two the following.** **08**
- a) Explain slew rate & CMRR.
 - b) Explain the OpAmp as a schmitt trigger circuit.
 - c) Explain the OpAmp as an adder circuit.
- Q.4 Answer any Two the following.** **08**
- a) Explain the OpAmp as a differentiator circuit.
 - b) Explain the current mirror bias circuit for differential amplifier.
 - c) Explain the OpAmp zero crossing detector.
- Q.5 Answer any One the following.** **08**
- a) Explain the following.
 - 1) OpAmp as a triangular wave generator.
 - 2) OpAmp as a current to voltage converter.
 - b) State the various configurations of OpAmp & need of closed loop configuration. Derive the gain relation for the closed loop non-inverting configuration.

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**B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Paper – VII)**

Sedimentary and Metamorphic Petrology (22221414)

Day & Date: Tuesday, 30-04-2024
Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagram wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Multiple choice questions:

08

- 1) The _____ sedimentary rocks are formed by deposition of sediments in standing, quiet water environment.

a) rudaceous	b) arenaceous
c) argillaceous	d) residual
- 2) Which of the following shows non-foliated fabric?

a) Marble	b) Schist
c) Gneiss	d) None of these
- 3) A tendency of metamorphic rock to split easily along thin, smooth planes is called _____.

a) slaty cleavage	b) lamination
c) stratification	d) None of these
- 4) The sediments having size less than 1mm are called _____.

a) dust	b) pebbles
c) silt	d) boulders
- 5) Which type of sandstone has coarse grained, sub-rounded texture?

a) Arkose	b) Grit
c) ferruginous sandstone	d) argillaceous sandstone
- 6) The concentric coating of calcium carbonate can be seen in _____.

a) limestone	b) fossiliferous limestone
c) oolitic limestone	d) bauxite
- 7) Composition of dolomite is _____.

a) CaCO_3	b) MgCO_3
c) $\text{CaCO}_3, \text{MgCO}_3$	d) None of these
- 8) Gneiss represents _____ foliated fabric.

a) strongly	b) non
c) weakly	d) None of these

Q.2 Answer any Four of the following.

08

- a) What are calcareous deposits?
- b) What is migmatites?
- c) Give the two names of minerals present in zeolite facies.
- d) Define metamorphic facies.
- e) What is greywacke?

- Q.3 Write short notes on any Two of the following. 08**
- a) Limestone.
 - b) Eclogite Facies.
 - c) Rudaceous rocks with its varieties.
- Q.4 Answer any Two of the following. 08**
- a) Describe the bedding and stratification structures in sedimentary rock.
 - b) Describe the greenschist facies.
 - c) Describe the Arenaceous sedimentary rock.
- Q.5 Answer any One of the following. 08**
- a) Describe structures of metamorphic rock.
 - b) Describe process of formation of sedimentary rock.

- Q.3 Write short notes on any Two of the following. 08**
- a) Describe factors affecting antigenicity.
 - b) Write in short role of inflammation in immunity.
 - c) Describe in short about life cycle of Dengue virus.
- Q.4 Answer any Two of the following. 08**
- a) Write in short about agglutination reaction of Antigen and antibody.
 - b) Define antigen and write in short about types of antigen.
 - c) Describe in short about basic structure of antibody.
- Q.5 Answer any One of the following. 08**
- a) Describe in detail about the causative agent, pathogenesis, symptoms, laboratory diagnosis, prophylactic measures and treatment of enteric fever.
 - b) Describe in detail about the mechanical barriers involved in innate immunity.

- Q.3 Write short notes on any two of the following. 08**
- a) Global Warming
 - b) Forest Ecosystem
 - c) Desertification
- Q.4 Answer any Two of the following. 08**
- a) Explain the types of Aquatic Biomes.
 - b) Explain the causes of Water Pollutions.
 - c) Explain the causes of Climate Change.
- Q.5 Answer any one of the following. 08**
- a) What is Air Pollution? Explain the causes of Air Pollution.
 - b) Explain the Nature and Scope of Environmental Geography.

- Q.3 Write short notes on any two of the following.** **08**
- a) Volatile Memory.
 - b) Flash ADC.
 - c) Register array of 8085 processor.
- Q.4 Answer any Two of the following.** **08**
- a) Write assembly language program to transfer the block of 10-memory location.
 - b) With a neat diagram, explain the generation of $\overline{\text{MEMR}}$, $\overline{\text{MEMW}}$, $\overline{\text{IOR}}$ and $\overline{\text{IOW}}$ control signals by using decoder IC 74138.
 - c) Calculate the analog O/P voltage for R-2R DAC if digital data is 11010 For logic 1=10 Volt and for logic 0 = 0 volts.
- Q.5 Answer any one of the following.** **08**
- a) Classify the instruction set according to the function of instruction with suitable examples.
 - b) State the salient features of 8085 processor and explain ALU, Accumulator, and flag register of 8085 processor.

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**B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Paper – VIII)
Stratigraphy (22221415)**

Day & Date: Friday, 03-05-2024
Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks

Q.1 Select correct one.

08

- 1) Which of the following represent Pre-Cambrian formation?
 - a) Vindhyan
 - b) Dharwar
 - c) Cuddapah
 - d) All the above
- 2) James Hutton has given Principle of _____.
 - a) Unconformity
 - b) Discontinuity
 - c) Uniformitarianism
 - d) Disconformity
- 3) Inter-trapean beds belong to _____.
 - a) Dharwar
 - b) Vindhyan
 - c) Siwaliks
 - d) Deccan Trap
- 4) Age of Delhi super group is _____.
 - a) Cambrian
 - b) Precambrian
 - c) Silurian
 - d) Jurassic
- 5) Diamond deposits found in Panna region of _____ system.
 - a) Vindhyan
 - b) Dharwar
 - c) Cuddapah
 - d) Deccan Trap
- 6) Bhandar formation belongs to _____.
 - a) Vindhyan
 - b) Dharwar
 - c) Cuddapah
 - d) Deccan Trap
- 7) A Stratigraphic Principle of Order of Superposition has been given by _____.
 - a) James Hutton
 - b) Guttenberg
 - c) Nicholas Steno
 - d) William Smith
- 8) Which of the following is the smallest lithostratigraphic division?
 - a) Group
 - b) Super-group
 - c) Formation
 - d) All the above

Q.2 Answer any Four of the following.

08

- a) Define Index fossil.
- b) Define Stratigraphy.
- c) What are inter-trapean beds?
- d) Give two names of periods of Mesozoic.
- e) Give the name of Era representing recent life.

- Q.3 Write short notes on any Two of the following.** **08**
- a) Deccan Trap - Lithology and Distribution.
 - b) Lithology and Age of Dharwar super group.
 - c) Classification of Cuddapah super group.
- Q.4 Answer any Two of the following.** **08**
- a) Explain peninsular region of India.
 - b) Describe the classification of Delhi super group.
 - c) Economic importance of Dharwar super group.
- Q.5 Answer any One of the following.** **08**
- a) Describe lithology, distribution, life, age and economic importance of Cuddapah system.
 - b) Define Correlation. Describe any two Physical methods of stratigraphic correlation.

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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper – VIII)
Introduction to Industrial Microbiology (22221421)

Day & Date: Friday, 03-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks

Q.1 Multiple choice questions.

08

- 1) In which of the following the microorganisms grow on the surface of the medium?
 - a) submerged fermentation
 - b) surface fermentation
 - c) solid state fermentation
 - d) batch fermentation
- 2) What do you mean by scale up?
 - a) decreasing the scale of fermentation
 - b) decreasing the rate of agitation
 - c) increasing the scale of fermentation
 - d) decreasing rate of fermentation
- 3) _____ antibiotic shows effect on cell wall of Gram positive bacteria.
 - a) Penicillin
 - b) Streptomycin
 - c) Tetracycline
 - d) Kanamycin
- 4) Antibiotic producing microorganisms can be detected by the method _____.
 - a) Incorporation of CaCO₃ in the agar medium
 - b) Crowded plate technique
 - c) Indicator dye method
 - d) None of the above
- 5) Which of the following is a defined media?
 - a) Synthetic media
 - b) Crude media
 - c) Simple media
 - d) Complex media
- 6) Sulphite waste liquor is the waste of _____ industry.
 - a) sugarcane
 - b) dairy
 - c) paper and pulp
 - d) None of the above
- 7) Which of the following is not a nitrogen source.
 - a) waste liquor
 - b) corn steep liquor
 - c) yeast extract
 - d) peptone
- 8) The batch culture is an _____ culture system.
 - a) open
 - b) closed
 - c) isolated
 - d) semi closed

- Q.2 Answer any Four of the following. 08**
- a) Define primary screening.
 - b) What is a sparget?
 - c) Define black strape molasses.
 - d) What is pilot fermentor?
 - e) What is corn steep liquor?
- Q.3 Write short notes on any Two of the following. 08**
- a) Write a note on chemostat.
 - b) Give the details on Inoculum development.
 - c) Write an account on preservation of industrially important microorganisms.
- Q.4 Answer any Two of the following. 08**
- a) Draw a neat labelled diagram of a bioreactor.
 - b) Explain recovery of alcohol with a flow sheet diagram.
 - c) Give the difference between dual culture and multiple culture fermentation with suitable examples.
- Q.5 Answer any One of the following. 08**
- a) What is strain? With suitable example elaborate strain improvement.
 - b) Explain the concept of single cell protein fermentation in details.

- Q.2 Answer any four of the following.** **08**
- What are crystalline and amorphous solids?
 - What are electrolytic conductors?
 - Define entropy. Give its units.
 - State third law of thermodynamics.
 - Draw and label moving boundary apparatus for determination of transport numbers.
 - What are Weiss indices and Miller indices.
- Q.3 Write short notes on any two of the following.** **08**
- State and explain the Nernst distribution law. What are its limitations?
 - Describe the entropy change in mixing of gases.
 - Discuss the relation between specific and equivalent conductance.
- Q.4 Answer any two of the following.** **08**
- Explain the phenomenon of dissociation and association of solute in solvents.
 - Define transport number. Discuss factors influencing transport number.
 - Show that for thermodynamically irreversible process, the entropy change is always greater than zero at constant temperature.
Calculate the entropy change involved in the isothermal reversible expansion of 5 moles of an ideal gas from a volume of 5 dm³ to a volume 50 dm³.
(R= 8.314 JK⁻¹mol⁻¹).
- Q.5 Answer any one of the following.** **08**
- Describe the determination of equivalent conductance at infinite dilution of weak electrolyte.
Calculate equivalent conductance at infinite dilution of acetic acid at 298 K. Given that molar conductivities at infinite dilution of HCl, CH₃COONa and NaCl are 0.04261, 0.0091 and 0.01265 S.m²mol⁻¹ respectively.
 - Give principle of Bragg's equation? Derive Bragg's equation.
The glancing angle for the first order X-ray reflection from a given lattice plane is 9.8°. Calculate the glancing angle for the second and third order reflection from the same order.

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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper - VII)
Software Engineering (19201410)

Day & Date: Sunday, 12-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Multiple choice question.

08

- 1) The most important feature of spiral model is _____.
 a) Risk management b) Quality management
 c) Performance management d) Efficiency management
- 2) "Black" refers in the black box testing means _____.
 a) I-O is hidden b) Design is hidden
 c) User is hidden d) All of these
- 3) The first step in Software Development Life Cycle is _____.
 a) Preliminary Investigation b) System Design
 c) System Testing d) System Coding
- 4) _____ is sometimes referred as 'Bubble Diagram'.
 a) Flowchart b) ER- Diagram
 c) Decision table d) DFD
- 5) The modification of the software to match changes in the ever changing environment, falls under which category of software maintenance?
 a) Corrective b) Adaptive
 c) Perfective d) Preventive
- 6) Identify which one of the following is not a benefit of CASE Tools?
 a) It improves software quality b) Reduces time and cost
 c) Both a and b d) None of the above
- 7) What is Software Engineering?
 a) Designing a software
 b) Testing a software
 c) Application of engineering principles to the design a software
 d) None of the above
- 8) Which is NOT a software characteristic?
 a) Software does not wear out
 b) Software is flexible
 c) Software is not manufactured
 d) Software is always correct

Q.2 Answer any four of the following.

08

- 1) What are the 7 Phases of SDLC?
- 2) What is the DFD?
- 3) What is Decision Tree?
- 4) Who is System Analyst?
- 5) Define the term Entity and Attribute.
- 6) What are the types of decision table?

- Q.3 Write short notes on any two of the following.** **08**
- 1) Feasibility study
 - 2) Fact finding technique - Questionnaire
 - 3) What is flowchart? State the principles of flowcharting.
- Q.4 Answer any two of the following.** **08**
- 1) Explain white box testing techniques.
 - 2) Differentiate between logical DFD and physical DFD.
 - 3) Explain V shape model.
- Q.5 Answer any one of the following** **08**
- 1) Explain Top-down incremental implementation. State its advantages and disadvantages
 - 2) Explain the various types of system in detail.

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**B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
CHEMISTRY (Paper - VIII)**

Analytical & Industrial Inorganic Chemistry (19201408)

Day & Date: Wednesday, 10-04-2024

Max. Marks: 40

Time: 09:00 AM To 11:00 AM

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N=14, N=23, Cl=35.5)

Q.1 Choose the correct alternative from given option.

08

- 1) Solution of known strength is known as _____ solution.

a) normal	b) molar
c) standard	d) molal
- 2) BaSO₄ is mostly _____ precipitate.

a) crystalline	b) amorphous
c) curdy	d) gelatinous
- 3) In the manufacture of ammonia by Haber's process _____ is used as a catalyst.

a) Cobalt	b) V ₂ O ₅
c) Fe ₂ O ₃ + Mo	d) Nickel
- 4) Generally, sulphide ores are concentrated by _____ process.

a) gravity separation	b) froth floatation
c) magnetic separation	d) all of these
- 5) DMG is specific reagent for _____.

a) nickel	b) zinc
c) cobalt	d) copper
- 6) Solochrome black is _____ indicator.

a) auto	b) acid-base
c) metallochromic	d) redox
- 7) Phenolphthalein is _____.

a) neutral	b) strong base
c) weak inorganic acid	d) weak organic acid
- 8) For making of ball bearing _____ steel is used.

a) nickel	b) chrome
c) silicon	d) tungsten

- Q.2 Answer any four of the following. 08**
- a) What are the types acid base titration?
 - b) Define acid-base indicators and give example.
 - c) Which catalyst is used in the manufacture of H_2SO_4 by contact process?
Give optimum temperature for better yield of SO_3 .
 - d) Give the particle size of crystalline and gelatinous precipitate.
 - e) Define the terms.
 - 1) Hardening
 - 2) Case hardening
 - f) Draw a neat labelled diagram of froth floatation tank.
- Q.3 Write short notes on any two of the following. 08**
- a) Ostwald quinoid theory
 - b) Alloy steel
 - c) Froth floatation method
- Q.4 Answer any two of the following. 08**
- a) What is metallochromic indicator? Discuss the role of metallochromic indicator.
 - b) Discuss manufacture of sulphuric acid by contact process.
 - c) Draw neat labelled diagram of blast furnace. Discuss products of blast furnace.
- Q.5 Answer any one of the following. 08**
- a) Define neutralization curve. Explain the neutralization curve for titration between strong acid versus weak base.
 - b) Draw the structure of DMG and Oxine. Explain the role of organic precipitant DMG and oxine in gravimetric analysis and give advantages of organic precipitant.

Seat
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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper– VIII)
Database Management System (19201411)

Day & Date: Friday, 12-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Choose the correct alternative from the option. 08

- 1) Which of the following is the full form of DDL?
 - a) Data definition language
 - b) Dynamic Data language
 - c) Data Derivation language
 - d) Database definition language
- 2) Which normalization form is based on the transitive dependency?
 - a) 1NF
 - b) 2NF
 - c) 3NF
 - d) 4NF
- 3) Which of the following SQL command is used for removing (or deleting) a relation form the database?
 - a) Drop
 - b) Delete
 - c) Rollback
 - d) Remove
- 4) Total view of a database is known as?
 - a) Physical View
 - b) internal view
 - c) external view
 - d) conceptual view
- 5) Which of the following command is used to modify a column in a table?
 - a) Update
 - b) Alter
 - c) Drop
 - d) Set
- 6) A procedure is created with the _____ statement.
 - a) CREATE PROCEDURE
 - b) REPLACE PROCEDURE
 - c) Both a and b
 - d) None of the above
- 7) PL/SQL Loops are also known as _____.
 - a) Iterative Case Statements
 - b) Iterative Control Statements
 - c) Indentation Control Statements
 - d) Indentation Case Statements
- 8) The _____ KEY constraint uniquely identifies each record in a table.
 - a) foreign
 - b) primary
 - c) Identify
 - d) check

Q.2 Answer any four of the following. 08

- a) What is DBMS?
- b) What are the limitations of traditional file system?
- c) What is Entity?
- d) Difference between 2 tire and 3 tire architecture.
- e) What is concurrency control?
- f) What is trigger?

- Q.3 Write short notes on any two of the following. 08**
- a) Database Architecture
 - b) Normalization
 - c) E-R model
- Q.4 Answer any Two of the following. 08**
- a) Explain Components of DBMS.
 - b) Explain Dr. Codd's rules.
 - c) What is join and explain types of join?
- Q.5 Answer any one of the following. 08**
- a) What is transaction and explain transaction states, scheduling and its types.
 - b) Create employee table with fields first name, last name, emp_id, designation, joining date and salary and perform the following operation on employee table.
 - i) Insert 10 employee Records into Table
 - ii) Write an SQL query to print all employee details from the employee table order by FIRST_NAME as Ascending.
 - iii) Write an SQL query to print details of the employee whose SALARY lies between 100000 and 500000.
 - iv) Write an SQL query to print details of the employee who have joined in Feb'2014.
 - v) Write an SQL query to count total rows from a table.
 - vi) Write an SQL query to fetch employee names with start alphabet 's'.

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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
PHYSICS (Paper - VII)
Optics (19201434)

Day & Date: Saturday, 13-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagram and give equations wherever necessary.
 4) Use of log table and calculator is allowed.

Q.1 Choose the correct alternatives from the options.

08

- 1) Langrange's law for magnification is given by _____.
 a) $n_1 y_1 \tan \theta_1 = n_2 y_2 \tan \theta_2$ b) $n_1 y_1 \sin \theta_1 = n_2 y_2 \sin \theta_2$
 c) $n_1 y_1 \tan \theta_1 = n_2 y_2 \sin \theta_2$ d) $n_1 y_1 \cos \theta_1 = n_2 y_2 \cos \theta_2$
- 2) Find the resolving power of grating which can just resolve the wavelengths 5890 Å and 5896 Å.
 a) 491 b) 981
 c) 392 d) 296
- 3) By Rayleigh's criterion, two spectral lines are said to be just resolved if the intensity at the dip is _____ times the intensity of either of the maxima.
 a) $\frac{\pi^2}{8}$ b) $\frac{8}{\pi^2}$
 c) $\frac{4}{\pi^2}$ d) $\frac{\pi^2}{4}$
- 4) The substances which rotate the plane of polarization to the left of the observer are called _____.
 a) Optically active b) dextrorotary
 c) Laevorotatory d) laevo as well as dextro rotatory
- 5) Principal planes are the cardinal planes of _____.
 a) unit positive angular magnification
 b) unit positive lateral magnification
 c) unit positive longitudinal magnification
 d) unit negative angular magnification
- 6) In F-P interferometer, high quality quartz plates may be of _____ in diameter and _____ thick.
 a) 1 to 7 mm, 3 to 10 cm b) 1 to 20 cm, 1 to 3 mm
 c) 1 to 3 cm, 1 to 5 mm d) 1 to 7 cm, 3 to 10 mm
- 7) In Fresnel's diffraction, the area of each half period zone is _____.
 a) $2\pi b\lambda$ b) $\pi b\lambda$
 c) $3\pi b\lambda$ d) $4\pi b\lambda$
- 8) The half angular width of the central maximum is _____.
 a) $d\theta = 1.22 \frac{\lambda}{D}$ b) $d\theta = 2.44 \frac{\lambda}{D}$
 c) $d\theta = 1.22 \frac{D}{\lambda}$ d) $d\theta = 2.44 \frac{D}{\lambda}$

- Q.2 Answers any four of the following. 08**
- For an optical image forming system, the refractive indices of the initial and final media are water ($n_1 = 1.33$) and air respectively. If the focal length in the image space is + 10 cm, calculate the focal length in the object space.
 - State any two points of superiority of Fabry-Perot interferometer over Michelson's interferometer.
 - Explain Zone plate.
 - State any two advantages of optical fibers.
 - Explain any two differences between geometrical and spectral resolution.
 - Explain numerical aperture.
- Q.3 Answer any two of the following. 08**
- Show that area of each half period zones are equal.
 - Define Double refraction. State the characteristics of the phenomenon of double refraction.
 - Explain Graphical construction of image using cardinal points and obtain Newton's formula.
- Q.4 Answers any two of the following. 08**
- Obtain the relation between the lateral, longitudinal and angular magnifications.
 - Calculate the length of the base of a 60° prism capable of just resolving the sodium lines of wavelength 5896 \AA and 5890 \AA . The material of the glass has $\mu_C = 1.6545$ and $\mu_E = 1.6635$ for C and E lines in the solar spectrum of wavelength 6563 \AA and 5270 \AA respectively.
 - Explain the formation and working of Fibre - optic communication system.
- Q.5 Answers any one of the following. 08**
- Explain the principle, construction and working of Nicol Prism. Explain how Nicol prism can be used as analyzer.
 - With neat ray diagram, explain the construction of Michelson's interferometer. Explain its use of determination of the thickness of thin transparent plate.

- Q.3 Write short notes on any Two of the following.** **08**
- 1) Write note on endergonic reactions.
 - 2) Explain Douglas bag method.
 - 3) Write note on TCA cycle.
- Q.4 Answer any Two of the following.** **08**
- 1) Explain protein buffer system of blood in body.
 - 2) Explain on degradation of pyrimidine.
 - 3) Write note on oxidative phosphorylation.
- Q.5 Answer any One of the following.** **08**
- 1) Define nutrition. Explain proteins in terms of biological value, essential and non-essential amino acids.
 - 2) What is amino acid metabolism? Write general reactions of amino acid metabolism.

- Q.3 Write short notes on any two of the following** **08**
- a) Biological weed control
 - b) Parasitic Weeds
 - c) Phytopathogenic Nematodes
- Q.4 Answer any two of the following.** **08**
- a) Write the classification of weeds based on ontogeny.
 - b) Write the properties, mode of action and use of 2, 4-D.
 - c) Describe the losses caused by weeds.
- Q.5 Answer any one of the following.** **08**
- a) Describe the weed “congress grass” w.r.t. botanical name, morphology, reproduction and management.
 - b) Describe the cultural methods of weed management.

Seat No.	
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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
PHYSICS (Paper - VIII)
Modern Physics (19201435)

Day & Date: Tuesday, 16-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Multiple choice questions.

08

- 1) The inertial frame of reference is _____ frame of reference.
 - a) an accelerated
 - b) unaccelerated
 - c) a rotating
 - d) a steady
- 2) Mass energy equivalence is expressed as _____.
 - a) $E = mc$
 - b) $E^2 = mc^2$
 - c) $E = mc^2$
 - d) $E = m^2c$
- 3) The wavelength of matter waves is independent of _____.
 - a) mass
 - b) velocity
 - c) momentum
 - d) charge
- 4) If the particle velocity is $c/2$, then the phase velocity of the matter wave associated with the particle is _____.
 - a) $c/2$
 - b) $2c$
 - c) $2/c$
 - d) c^2
- 5) Zeeman effect is the splitting of spectral lines in the presence of _____.
 - a) electric field
 - b) magnetic field
 - c) inert environment
 - d) vacuum
- 6) Spin quantum number associated with single electron is _____.
 - a) zero
 - b) one
 - c) one half
 - d) two
- 7) Energy released per fission of U235 is about _____.
 - a) 200 MeV
 - b) 300 MeV
 - c) 400 MeV
 - d) 500 MeV
- 8) The value of change in Compton wavelength is _____.
 - a) 2.42 \AA
 - b) 0.0242 \AA
 - c) 0.242 \AA
 - d) 24.2 \AA

Q.2 Answers any four of the following.

08

- a) State Einstein postulates on special theory of relativity.
- b) A body of mass 100 gm is moving with a velocity of 10 m/s. Find its De Broglie wavelength. Given: $h = 6.62 \times 10^{-34} \text{ Js}$.
- c) State Pauli's exclusion principle.
- d) What is Compton effect?
- e) Define nuclear fission.
- f) State Hund's Rule.

- Q.3 Attempt any two of the following.** **08**
- a) Obtain Bohr's quantum conditions on the basis of matter waves.
 - b) Describe working of nuclear reactor with its essential parts.
 - c) A rod of length 2 m kept in a satellite with its length along the direction of motion. If the satellite has velocity $0.8c$, calculate the length of the rod as measured by an observer.
 - 1) in the satellite and
 - 2) in the stationary laboratory
- Q.4 Answers any two of the following.** **08**
- a) An electron is put in a one-dimensional box of length 1 \AA . Calculate the minimum uncertainty in its velocity. ($h = 6.62 \times 10^{-34} \text{ Js}$, $m = 9.1 \times 10^{-31} \text{ Kg}$)
 - b) Explain in detail on LS coupling and JJ coupling.
 - c) Discuss experimental arrangement to verify Compton effect.
- Q.5 Attempt any one of the following.** **08**
- a) Describe Stern and Gerlach Experiment and hence discuss importance of result.
 - b) Derive the expression for variation of mass with velocity.

Seat
No.

B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
BIO-CHEMISTRY (Paper - IV)
Molecular Biochemistry & Diseases (19201405)

Day & Date: Thursday, 18-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions.**08**

- 1) _____ is responsible for hypoglycemia.
 - a) Glycogenolysis
 - b) Gluconeogenesis
 - c) Glycogenesis
 - d) both a and b
- 2) _____ acts as an inducer of the lac operon.
 - a) Allolactose
 - b) Lactose
 - c) Galactose
 - d) Glucose
- 3) The nucleus of cancerous cells becomes _____.
 - a) unchanged
 - b) degenerated
 - c) abnormally large
 - d) hypertrophide
- 4) End product of reverse transcription is _____.
 - a) RNA
 - b) DNA
 - c) protein
 - d) lipid
- 5) The two polypeptides of human insulin are linked together by _____.
 - a) phosphodiester bonds
 - b) covalent bonds
 - c) disulphide bridges
 - d) hydrogen bonds
- 6) An example of homology and similarity tool is _____.
 - a) GDB
 - b) EMBOSS
 - c) BLAST
 - d) OMIM
- 7) _____ protects our body against disease causing pathogens.
 - a) Respiratory system
 - b) Digestive system
 - c) Vascular system
 - d) Immune system
- 8) The immune cells that consist of CD4 receptors is _____.
 - a) T helper cells
 - b) monocytes
 - c) macrophages
 - d) dendritic cells

Q.2 Answer any Four of the following.**08**

- a) What is gene cloning?
- b) Write two characteristics of tumor cells.
- c) What are the symptoms of diabetes?
- d) Write two applications of bioinformatics.
- e) What turnover number?
- f) What is nephropathy and neuropathy?

- Q.3 Write short notes on any Two of the following.** **08**
- a) Write note on Database similarity searching (BLAST).
 - b) Explain Induced fit hypothesis.
 - c) Write note on two anti AIDS drugs.
- Q.4 Answer any Two of the following.** **08**
- a) Write formation of insulin from preproinsulin.
 - b) Write characteristics of tumor cells.
 - c) Explain transcription in prokaryotes.
- Q.5 Answer any One of the following.** **08**
- a) What is natural & acquired immunity? Explain Immune response to antigen. Clonal selection theory for formation of antibodies.
 - b) Explain Lock & key model and write note on active site of enzyme and its features.

Seat
No.

B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
PLANT PROTECTION (Paper - VIII)
Insect Pests and Their Management (19201438)

Day & Date: Thursday, 18-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equation wherever necessary.
 3) Figure to the right indicates full marks.
 4) Use of log table and calculator is allowed.

Q.1 Multiple Choice Questions.**08**

- 1) In _____ Bengal state suffered from lack of food due to brown spot disease on Rice.
 - a) 1942
 - b) 1943
 - c) 1944
 - d) 1945
- 2) In Shri Lanka coffee crop was destroyed by _____ disease.
 - a) rust
 - b) smut
 - c) viral
 - d) bacterial
- 3) Classification of insect and pest based on _____.
 - a) nature of damage
 - b) mouth parts
 - c) metamorphosis
 - d) all of these
- 4) Hand rotary duster is the example of _____.
 - a) mouth parts
 - b) metamorphosis
 - c) nature of damage
 - d) all of these
- 5) Thrips is the example of _____ crop.
 - a) Sugarcane
 - b) Jowar
 - c) Groundnut
 - d) Rose
- 6) Red Spider damage the crop like _____.
 - a) Sugarcane
 - b) Rose
 - c) Tomato
 - d) Mango
- 7) The _____ which are released to attract opposite sex are called as sex attract.
 - a) Repellents
 - b) Pheromones
 - c) Chemo sterilant
 - d) All of these
- 8) Fruit borer is the example of _____ crop.
 - a) Mango
 - b) Brinjal
 - c) Tomato
 - d) Rose

Q.2 Answer any Four of the following.**08**

- a) Give the definition of quantitative.
- b) Define abdomen.
- c) What is wettable power?
- d) Define attractants.
- e) Give the two control measures of Rose.
- f) Write two control measures of Tomato.

- Q.3 Write short note on any Two of the following. 08**
- a) Types of legs
 - b) Pulse beetle
 - c) Metamorphosis
- Q.4 Answer any Two of the following. 08**
- a) Explain the nature of damage and management of Gram.
 - b) Describe the classification based on mode of entry.
 - c) Give the mark of identification and life cycle of Groundnut.
- Q.5 Answer any One of the following. 08**
- a) Explain the classification of insect pests based on the mouth parts.
 - b) Describe the Sugarcane insect pest in details.

- Q.2 Attempt any four of the following.** **08**
- a) State m. g. f of exponential with parameter θ .
 - b) State mean and variance of standard normal variate
 - c) Write p. d. f. $G(\alpha, \lambda)$ distribution.
 - d) state m. g. f. of $N(\mu, \sigma^2)$ distribution.
 - e) Define student's t-distribution.
- Q.3 Attempt any Two of the following questions.** **08**
- a) Find C.D.F. of exp (θ) variate.
 - b) Find mode of chi -square variate with n d. f.
 - c) State and prove additive property of $G(\alpha, \lambda)$ variate.
- Q.4 Attempt any Two of the following questions.** **08**
- a) If $X \sim N(\mu, \sigma^2)$ variate then find distribution of $y = ax + b$.
 - b) Let $X \sim U[a, b]$ then find $E(X)$.
 - c) $X \sim \beta_I(m, n)$ then find $E(X)$.
- Q.5 Attempt any One of the following questions.** **08**
- a) If $X \sim \beta_{II}(m, n)$ then find distribution of $\frac{x}{1+x}$.
 - b) Derive the p. d. f. of chi – square variate with n d. f.

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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
METEOROLOGY (Paper – III)
Applied Climatology (19201431)

Day & Date: Saturday, 20-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams wherever necessary.
 4) Use of stencils is allowed.

Q.1 Choose the correct alternative and rewrite sentences.

08

- 1) The _____ heat island are formed due to additional of heat from automobile.

a) Hamlet	b) Rural
c) Urban	d) village
- 2) Surface pressure varies routinely from about _____ mb to 1050mb.

a) 950	b) 955
c) 960	d) 965
- 3) Shivering is physiological response to _____ condition.

a) Cloudy	b) cold
c) warm	d) hot
- 4) The primary purpose of clothing is to protect man against _____ and improve his physiological compare

a) humidity	b) temperature
c) wind	d) weather
- 5) The term 'forecast' was first applied in meteorology by _____.

a) Miller	b) Fitzroy
c) Coriolis	d) Trewartha
- 6) When the isobars are widely spaced the pressure gradient is _____.

a) Gentle	b) moderate
c) steep	d) vertical
- 7) Medium range forecast up to _____ days.

a) 3 to 21	b) 3 to 26
c) 3 to 48	d) 3 to 72
- 8) Statistical methods are used for _____ range forecasting of weather.

a) Short	b) medium
c) long	d) daily

Q.2 Answer any four of the following.

08

- a) Define urban climate.
- b) Human body comfort.
- c) What is heat island?
- d) What is periodic local wind?
- e) Coriolis effect.

- Q.3 Write short notes on any Two of the following. 08**
- a) Atmospheric pressure
 - b) Agro climatology
 - c) Climate and industry
- Q.4 Answer any Two of the following. 08**
- a) State the importance of air operation in transportation.
 - b) Statistical weather forecasting.
 - c) What are the rotational forces?
- Q.5 Answer any one of the following. 08**
- a) Explain urban climate on body comfort
 - b) Explain off- shore drilling.

- Q.3 Write short notes on any Two of the following. 08**
- a) Write note on origin of petroleum and origin of coal.
 - b) Explain chemical equilibrium in case of hydrogen chloride.
 - c) Write note on organic matter in black shale.
- Q.4 Answer any Two of the following questions. 08**
- a) Write note on hydrolysis of Na_2CO_3 .
 - b) What is water pollution? Explain types of water pollution.
 - c) Explain treatment on water pollutant by chemical oxygen demand.
- Q.5 Answer any one of the following. 08**
- a) Explain acids and bases, Chemical definition, Geological usage and effect of pH.
 - b) Explain Le chatelier's rule and Van't Hoff isotherm equation.

- Q.3 Write short notes on any two of the following.** **08**
- a) Groups of the carbohydrates with their examples.
 - b) Structure of antibody.
 - c) Clinical significance of lipids
- Q.4 Answer any two of the following.** **08**
- a) Difference between DNA and RNA.
 - b) Biological significance of immunoglobulin.
 - c) What are the properties of enzymes?
- Q.5 Answer any one of the following.** **08**
- a) Describe protein synthesis/Central dogma in detail.
 - b) Describe types and structure of compound lipids.

- Q.2 Answer any four of the following.** **08**
- a) Define Composite Hypothesis.
 - b) Define Type-II error.
 - c) Define level of significance.
 - d) State Central limit theorem.
 - e) Define CDR.
- Q.3 Write short notes on any two of the following.** **08**
- a) Describe the procedure to test for testing population mean $\mu = \mu_0$ based on Normal distribution.
 - b) Describe Paired t- test.
 - c) Define Components of time series.
- Q.4 Answer any two of the following.** **08**
- a) Define Total Fertility Rate (TFR). Also state the merits and demerits of TFR.
 - b) Explain the test procedure for testing equality of two population variances.
 - c) A r.v X is such that $E(X) = 3$ and $E(X^2) = 13$
 - 1) Find least value for $P(|X - 3| < 4)$
 - 2) Determine lower bound for $P(-2 < X < 8)$.
- Q.5 Answer any one of the following.** **08**
- a) Describe the procedure for testing
 - 1) $H_0: P = P_0$ against $H_1: P \neq P_0$ and
 - 2) $H_0: P_1 = P_2$ against $H_1: P_1 \neq P_2$ based on normal distribution.
 - b) Explain the procedure of moving average method and gives merits and demerits.

- Q.3 Write short notes on any Two of the following. 08**
- a) With neat diagram explain construction and working of mercury barometer.
 - b) Explain construction and working of dry and wet bulb thermometer.
 - c) What is thermopile?
- Q.4 Answer any Two of the following. 08**
- a) With neat diagram explain construction and working of mercury thermometer.
 - b) Write a note on "The different temperature scales."
 - c) Draw neat diagram of barograph.
- Q.5 Answer any one of the following. 08**
- a) With neat diagram explain construction and working of float gauge.
 - b) With neat diagram explain construction and working of Hooke's anemometer.

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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
GEO-CHEMISTRY (Paper – IV)
Chemistry of the Earth (19201420)

Day & Date: Tuesday, 23-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic table and calculator is allowed.
 (At. Wts.: H=1, C=12, O=16, N= 14, Na =23, Cl = 35.5)

Q.1 Fill in the blanks with correct answer from given options. 08

- 1) The number of water molecules be packed around a given ion depends on the _____.
 a) Size of the ion
 b) Shape of the ion
 c) Charge on the ion
 d) Cohesive forces between water molecules
- 2) The swelling and shrinkage properties of soil are due to _____.
 a) Kaolinite
 b) Halloysite
 c) Montmorillonite
 d) None of these
- 3) Smoke, fumes, ash, dust, nitric oxide and sulphur dioxide are the main sources of _____.
 a) Primary Pollutants
 b) Secondary pollutants
 c) Bio-Degradable Pollutants
 d) None of the above
- 4) In geochemical classification of sediments, which of the following is evaporates.
 a) $\text{Fe}(\text{OH})_2$
 b) CaCO_3
 c) NaCl
 d) SiO_2
- 5) _____ is the reaction of rock minerals with oxygen, thus changing the mineral composition of rock.
 a) Hydration
 b) Hydrolysis
 c) Oxidation
 d) Reduction
- 6) Which of the following method is used for dating relatively recent geological event?
 a) K - Ar method
 b) U - Pb method
 c) Carbon - 14 method
 d) Rb - Sr method
- 7) Ionic potential is:
 a) Charge on the ions.
 b) Charge multiplied by radius
 c) Charge divided by radius
 d) Radius divided by charge
- 8) Type of soil depends upon:
 a) Parent rock
 b) Climate
 c) Biological activity
 d) All the above

- Q.2 Answer any Four of the following. 08**
- a) Name the most stable form of manganese in the secondary environment.
 - b) Define oxidation potential.
 - c) Give the factors affecting the rate of formation of soil are:
 - d) Which type of clay structure has one tetrahedral layer linked with one octahedral layer.
 - e) Name any two stable isotopes.
 - f) Name the horizons of soil profile.
- Q.3 Write short notes on any Two of the following. 08**
- a) Describe the process of formation of clay minerals.
 - b) Explain the concept of 'Crust as a separate system'.
 - c) Describe in short the Hydrogen ion concentration.
- Q.4 Answer any Two of the following. 08**
- a) Explain the geochemical cycle with neat labeled diagram.
 - b) Write short note on soil degradation.
 - c) Describe in brief the radioactive decay.
- Q.5 Answer any one of the following. 08**
- a) Explain in brief the processes of chemical weathering with suitable examples.
 - b) Discuss in brief the causes, effects and control measures of air pollution.

- Q.3 Write short notes on any Two of the following. 08**
- a) Explain types of blood cells.
 - b) Give ultra-structure of striated muscle.
 - c) Disorder of parathyroid gland.
- Q.4 Answer any Two of the following. 08**
- a) Describe In-vitro Fertilization.
 - b) Explain oestrous cycle.
 - c) Describe T.S. of Liver of mammal.
- Q.5 Answer any one of the following. 08**
- a) Describe in detail menstrual cycle.
 - b) Sketch, label and describe T.S. of mammalian testis.

Seat
No.Set **P**

B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper - VII)
Differential Equations (19201428)

Day & Date: Wednesday, 24-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Choose the correct alternative for each of the following.**08**

- 1) The solution of the differential equation $p^2 - 9p + 18 = 0$ is _____.
- a) $(y + 3x - c)(y + 6x - c) = 0$ b) $(y + 3x - c)(y - 6x - c) = 0$
 c) $(y - 3x - c)(y - 6x - c) = 0$ d) $(y - 3x - c)(y + 6x - c) = 0$
- 2) The solution of the differential equation $p = \log(px - y)$ is _____.
- a) $y = cx + e^c$ b) $y = cx + e^{-c}$
 c) $y = cx - e^{-c}$ d) $y = cx - e^c$
- 3) The differential equation of the form $y = 2px + f(xp^2)$ reduces to Clairaut's form by Substitution _____.
- a) $x^2 = u, y = v$ b) $x = u^2, y = v$
 c) $x = u^2, y = v^2$ d) $x = u, y = v^2$
- 4) If _____ then $y = x$ is the one known solution of complementary function of the differential equation.
- $$\frac{d^2y}{dx^2} + P \frac{dy}{dx} + QY = R$$
- a) $P - xQ = 0$ b) $1 + P + Q = 0$
 c) $P + xQ = 0$ d) $1 - P + Q = 0$
- 5) The one known solution of the equation $x \frac{d^2y}{dx^2} - (1 - x) \frac{dy}{dx} - y = 0$ is $y =$ _____.
- a) e^{-x} b) e^x
 c) x^2 d) x
- 6) The homogeneous linear differential equation $x^n \frac{d^n y}{dx^n} + c_1 x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + \dots + c_{n-1} x \frac{dy}{dx} + C_n y = X(x)$ can be reduced to linear equation with constant coefficients by using substitution _____.
- a) $x = z^2$ b) $x = \frac{1}{z}$
 c) $x = e^z$ d) $x = \log z$
- 7) One solution of the equation $\frac{dx}{yz} = \frac{dy}{xz} = \frac{dz}{xy}$ is _____.
- a) $x^2 - y^2 = c_1$ b) $y^2 + z^2 = c_1$
 c) $x^2 + y^2 = c_1$ d) $x - y = c_1$

- 8) The differential equation of the form $Pdx + Qdy + Rdz = 0$,
 (where P, Q and R are functions of x, y, z) are called _____ differential equation.
- | | |
|----------------|--------------------|
| a) homogeneous | b) non-homogeneous |
| c) total | d) simultaneous |

Q.2 Answer any four of the following.

08

- Solve $x^2p^2 + 3xyp + 2y^2 = 0$
- Solve $(y - px)(p - 1) = p$
- Define Clairaut's equation and explain the method of solving it.
- Solve $x^2 \frac{d^2y}{dx^2} + 4x \frac{dy}{dx} + 2y = 0$
- Solve $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$
- Test the condition of integrability for the differential equation $2yz dx - 3zx dy - 4xy dz = 0$

Q.3 Answer any two of the following.

08

- Solve $y = 2px + x^2p^4$
- Explain the method of solving the differential equation $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + QY = R$,
 (where P, Q , and R are functions of x only)
 by changing the dependent variable.
- Solve $\frac{dx}{y^2} = \frac{dy}{x^2} = \frac{dz}{x^2y^2z^2}$

Q.4 Answer any two of the following.

08

- Solve $x^2 \frac{d^2y}{dx^2} - 2(x^2 + x) \frac{dy}{dx} + (x^2 + 2x + 2)y = 0$
- Solve $\frac{dx}{x^2 - yz} = \frac{dy}{y^2 - zx} = \frac{dz}{z^2 - xy}$
- State and prove the necessary condition for the integrability of the differential equation $Pdx + Qdy + Rdz = 0$
 (where P, Q and R are functions of x, y, z)

Q.5 Answer any One of the following.

08

- Show that a homogeneous Linear differential equation

$$x^n \frac{d^n y}{dx^n} + c_1 x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + \dots + c_{n-1} x \frac{dy}{dx} + c_n y = X(x)$$

(where $c_1, c_2 \dots$ and c_n are Constants) can be transformed into a Linear differential equation with constant coefficients by changing the independent variable x to z using the substitution $x = e^z$

Hence solve $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = x$

- Explain the method how to solve the second order Linear differential equation $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$
 (where P, Q & R are functions of x only)
 when one solution belonging to complementary function is known.

- Q.3 Write short notes on any Two of following.** **08**
- a) Significance of vernalization.
 - b) Phloem loading.
 - c) Role of phytochrome.
- Q.4 Answer any Two of the following.** **08**
- a) Explain the cyclic reaction studied by you.
 - b) Give the structure of mitochondria.
 - c) Describe the significance of photorespiration.
- Q.5 Answer any One of the following.** **08**
- a) Describe the mechanism of photorespiration.
 - b) Explain the photosynthetic apparatus studied by you.

Seat
No.

B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper - VIII)
Abstract Algebra - I (19201429)

Day & Date: Friday, 26-04-2024
 Time: 9:00 AM To 11:00 AM

Max. Marks: 40

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

Q.1 Choose correct alternatives for each of the following.**08**

- 1) The symmetric group S_n has _____ elements.
 - a) n
 - b) $n!$
 - c) $\frac{n!}{2}$
 - d) $\frac{n(n-1)}{2}$
- 2) Which of the following is not a group?
 - a) $\langle Z, + \rangle$
 - b) $\langle R, + \rangle$
 - c) $\langle N, + \rangle$
 - d) $\langle C, + \rangle$
- 3) The number of subgroups of Z_8 are _____.
 - a) 1
 - b) 2
 - c) 5
 - d) 4
- 4) The value of expression $[2] \odot [4]$ in Z_5 is _____.
 - a) [2]
 - b) [3]
 - c) [4]
 - d) [5]
- 5) If H and K are subgroups of a group G then HK is subgroup of G iff _____.
 - a) $HK = KH$
 - b) $HK = G$
 - c) $HK = H$
 - d) $KH = H$
- 6) IF ϕ is Euler function then $\phi(41) =$ _____.
 - a) 41
 - b) 40
 - c) 39
 - d) 1
- 7) The number of generators of the group Z_8 is _____.
 - a) One
 - b) Two
 - c) Four
 - d) Five
- 8) Let $f: G \rightarrow G'$ be homomorphism then $\ker f =$ _____.
 - a) $\{x \in G / f(x) = e'\}$
 - b) $\{x \in G / f(x) = e\}$
 - c) $\{x \in G / f(x) = x\}$
 - d) $\{x \in G / f(x) = G\}$

Q.2 Solve any four of the following: **08**

- a) Show that the identity element in group G is unique.
- b) If $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 3 & 7 & 2 & 4 & 5 & 6 & 1 & 8 \end{pmatrix}$ $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\ 1 & 2 & 3 & 8 & 5 & 4 & 7 & 6 \end{pmatrix}$ find $\alpha \cdot \beta$
- c) Draw a Cayley table $Z_5^\#$
- d) Solve the equation $(12)x = (123)$ in S_3 .
- e) If R is additive group of real numbers and R_+ is multiplicative group of positive real numbers then $f: R \rightarrow R_+$ defined by $f(x) = e^x$ then show that f is homomorphism.
- f) Show that Every cyclic group is an abelian group.

Q.3 Attempt any two of the following. **08**

- a) Find order of element of a group $\{1, -1, i, -i\}$ under complex multiplication.
- b) Determine the right cosets of $\langle [4] \rangle$ in Z_{12}
- c) Show that intersection of any two normal subgroup is normal subgroup.

Q.4 Attempt any two of the following. **08**

- a) State and prove Lagrange's theorem.
- b) Show that $(G, +_6)$ is abelian group.
Where $G = \{0, 1, 2, 3, 4, 5\}$ and $+_6$ is addition modulo 6 is binary operation.
- c) For permutation $\sigma = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 3 & 1 & 4 & 5 & 6 & 2 \end{pmatrix}$ $T = \begin{pmatrix} 1 & 2 & 3 & 4 & 5 & 6 \\ 2 & 4 & 1 & 3 & 6 & 5 \end{pmatrix}$ find $T^2\sigma$ and σ^2T

Q.5 Attempt any one of the following. **08**

- a) State and prove Cayley's theorem.
- b) Find g.c.d. of 616 and 427 and express $(616, 427) = 616x + 427y$

- Q.3 Write short notes on any Two of the following. 08**
- a) Give the functions of tapetum.
 - b) Describe anomalous secondary growth in *Dracaena* stem.
 - c) Write on agents of pollination.
- Q.4 Answers any Two of the following. 08**
- a) Describe self-seed dispersal mechanism in plants.
 - b) Describe flower as a modified determinate shoot with evidence.
 - c) Describe pollination mechanism in *Vallisneria*.
- Q.5 Answers any One of the following. 08**
- a) Describe the development of male gametophyte with diagrams.
 - b) What is endosperm? Describe the development of different types of endosperms.

- Q.2 Answer the following. (Any Four). 08**
- a) What is mean by Technology Parks?
 - b) In which state (Only name) the iron and steel is located in India?
 - c) Define the Subsistence agriculture?
 - d) Write down the example of secondary activity (only names)?
 - e) Definition of economic geography?
- Q.3 Write short notes on. (Any Two) 08**
- a) Transport
 - b) SEZ
 - c) Forestry
- Q.4 Answer the following. (Any Two) 08**
- a) What is mean by agriculture & explain the commercial agriculture?
 - b) Describe the industrial location theory by Weber in short?
 - c) Describe the Concept of economic activity and Explain it's classification in short?
- Q.5 Answer the following. (Any One) 08**
- a) Explain the agriculture land use model by Vonthunen?
 - b) Explain the factors affecting location of economic activity?

Seat
No.

Set P

B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper – VII)
Operational Amplifier and Applications (19201413)

Day & Date: Monday, 29-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic tables and calculator is allowed.

Q.1 Multiple choice questions.**08**

- 1) The _____ configuration of OpAmp offers gain less than one.
 - a) inverting
 - b) differential
 - c) non- inverting
 - d) both a and b
- 2) The bandwidth of open loop configuration of OpAmp circuits is _____.
 - a) almost zero
 - b) audio frequency range
 - c) infinity
 - d) radio frequency range
- 3) In case of emitter coupled differential amplifier, the constant current bias circuit is used to make _____ stable.
 - a) collector current of Q1 transistor
 - b) collector current of Q2 transistor
 - c) tail current
 - d) both a and b
- 4) To construct zero crossing detector using OpAmp, the reference voltage is _____.
 - a) +zero Volt
 - b) - zero volt
 - c) zero Volt
 - d) All of these
- 5) The _____ configuration of OpAmp is used for voltage follower circuit.
 - a) closed loop inverting
 - b) open loop non-inverting
 - c) open loop inverting
 - d) closed loop non-inverting
- 6) In case of OpAmp non-inverting amplifier, input voltage is 2 mV, input resistance is 15 KOhm and feedback resistance is 45 KOhm then the out voltage is _____.
 - a) 2 mV
 - b) 6 mV
 - c) 8 mV
 - d) 4 mV
- 7) The voltage to current converter using OpAmp is also called as _____ amplifier.
 - a) transresistance
 - b) buffer
 - c) transconductance
 - d) conductance
- 8) In case of basic differentiator circuit using OpAmp, the capacitor is connected _____ path.
 - a) in feedback
 - b) at the inverting terminal
 - c) at the non-inverting terminal
 - d) in designer chosen

- Q.2 Answer the following. (Any Four) 08**
- a) State any four ideal characteristics of Operational Amplifier.
 - b) Find the CMRR in dB, if A_d is 12000 and A_c is 0.60.
 - c) State the need of differential amplifier.
 - d) Define the OpAmp parameter Input bias current and input offset voltage.
 - e) State any two non-linear application of OpAmp.
 - f) Draw the neat labelled equivalent circuit of OpAmp.
- Q.3 Write short notes on. (Any Two) 08**
- a) Define slew rate & explain it.
 - b) Explain the current mirror bias circuit for differential amplifier.
 - c) Explain the adder circuit using OpAmp.
- Q.4 Answer the following (Any Two) 08**
- a) Explain the triangular wave generator using OpAmp.
 - b) Explain the Integrator circuit using OpAmp.
 - c) Explain the zero crossing detector using OpAmp.
- Q.5 Answer the following (Any One) 08**
- a) State the various configurations of OpAmp & need of closed loop closed loop configuration. Derive the gain relation for the closed loop Inverting configuration.
 - b) Explain the following.
 - 1) Astable multivibrator using OpAmp.
 - 2) Current to voltage converter using OpAmp.

- Q.3 Write short notes on. (Any Two) 08**
- a) Classification of Cuddapah.
 - b) Lithology and Age of Vindhyan.
 - c) Deccan Trap - Lithology and Distribution.
- Q.4 Answer the following. (Any Two) 08**
- a) Explain Indo - Gangetic Plains of India.
 - b) Umia series - Lithology and Life.
 - c) Economic importance of Dharwar.
- Q.5 Answer the following (Any One) 08**
- a) Describe lithology, distribution, life, age and economic importance of Cuddapah system.
 - b) Define Stratigraphy. Describe a principle of stratigraphy - 'Uniformitarianism'.

- Q.3 Write short notes on any Two of the following. 08**
- a) Active Immunity.
 - b) Immunofluorescence test.
 - c) Collection, handling & transportation of specimen.
- Q.4 Answer any Two of the following. 08**
- a) General features antigen antibody reactions.
 - b) Factors affecting antigenicity.
 - c) Cells of innate immunity and their role.
- Q.5 Answer any One of the following. 08**
- a) Write an essay on Basic structure of antibody (immunoglobulin).
 - b) Write an essay on enteric fever.

Seat No.	
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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
GEOGRAPHY (Paper – VIII)
Environmental Geography (19201417)

Day & Date: Thursday, 02-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:**
- 1) All questions are compulsory.
 - 2) Draw neat diagrams wherever necessary.
 - 3) Figures to the right indicate full marks.
 - 4) Use of Stencils is allowed.

Q.1 Multiple choice questions:

08

- 1) _____ is the combination of biotic and a-biotic components of the environment.

a) Ecosystem	b) Food chain
c) Esophagus	d) Colony
- 2) The term Environment means _____.

a) Region	b) Land
c) Surrounding	d) Area
- 3) The word Ecosystem was coined by _____.

a) Tansley	b) Fosobarg
c) Lindeman	d) Park
- 4) _____ is the most important animal in the grasslands of Australia.

a) Kangaroo	b) Primary
c) Cow	d) Tiger
- 5) _____ is known as producers.

a) Plant	b) Eater
c) Animal	d) Aquatic
- 6) World Environment Day is celebrated on _____ this day.

a) 5 th May	b) 5 July
c) 5 th June	d) 5 th August
- 7) _____ gas is responsible for global warming.

a) Carbon dioxide	b) Carbon monoxide
c) Oxygen	d) Nitrogen
- 8) Marine life is in danger due to _____ pollution.

a) Air	b) Land
c) Water	d) Sound

Q.2 Answer any four of the following.

08

- a) What is Environmental Geography?
- b) What is Biome?
- c) What is Food Web?
- d) What is Ecosystem?
- e) What is Air Pollution?

- Q.3 Write short notes on any two of the following. 08**
- a) Importance of environmental geography
 - b) Tundra Biome
 - c) Characteristics of ecosystem
- Q.4 Answer any two of the following. 08**
- a) Explain any four causes of global warming
 - b) Explain the human impact on environment.
 - c) Explain the A-biotic components of ecosystem
- Q.5 Answer any one of the following 08**
- a) Explain the nature of environmental geography?
 - b) Explain any four national environmental movements?

Seat No.	
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B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
ELECTRONICS (Paper – VIII)
Digital Techniques and Microprocessor (19201414)

Day & Date: Thursday, 02-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of a logarithmic table and calculator is allowed.

Q.1 Multiple choice questions:

08

- 1) _____ uses capacitors for storing the data.
 - a) SRAM
 - b) DRAM
 - c) Flash memory
 - d) PROM
- 2) _____ technique is used in the IC ADC 0804 for data conversion.
 - a) Single slope
 - b) Flash
 - c) Dual slope
 - d) SAR
- 3) In 8085 processor _____ is a non-maskable interrupt.
 - a) RST 7.5
 - b) RST 6.5
 - c) TRAP
 - d) INTR
- 4) RAL is an example of _____ addressing mode.
 - a) Implied
 - b) Immediate
 - c) Register
 - d) Direct
- 5) In linear address decoding _____ address are used for decoding purpose.
 - a) all unused
 - b) only one unused
 - c) no
 - d) all used
- 6) _____ instruction is a used to stop the execution of program.
 - a) SIM
 - b) EI
 - c) HLT
 - d) NOP
- 7) The suitable crystal frequency for 8085 microprocessors is _____.
 - a) 9 MHz
 - b) 12 MHz
 - c) 3 MHz
 - d) 6 MHz
- 8) _____ is the first machine cycle of every instruction.
 - a) opcode fetch
 - b) memory read
 - c) memory write
 - d) input read

Q.2 Answer any Four of the following.

08

- a) Compare RAM and ROM memory.
- b) Write the name of ICs i) 74244 ii) 74245 iii) 74138 iv) 74373
- c) Write the name pins used for serial data transfer in 8085 processor.
- d) Write the roll of ALE signal.
- e) Define accuracy and resolution of DAC.

- Q.3 Write short notes on any Two of the following. 08**
- a) Non-volatile memories.
 - b) Flash ADC.
 - c) Flag Register of 8085.
- Q.4 Answer any Two of the following. 08**
- a) What is instruction? State any three two-byte instruction.
 - b) Determine the analog output for 4-bit binary weighted DAC, if $0 = 0V$ and $1 = 5V$ for digital input 1) 1110 2) 1010.
 - c) Write assembly language program to add two 8-bit numbers.
- Q.5 Answer any One of the following. 08**
- a) Classify the instruction set of 8085 processor according to the functions of instruction with suitable example of each.
 - b) Explain the concept of Memory Mapped IO Scheme and IO mapped IO Scheme.

- Q.3 Write short notes on any Two of the following. 08**
- a) Imprints
 - b) Glossopteris and Gangamopeteris.
 - c) Cephalon in trilobites.
- Q.4 Answer any Two of the following. 08**
- a) Describe any two lamellibranches.
 - b) Describe evolution of horse.
 - c) Describe the Coelenterate.
- Q.5 Answer any One of the following. 08**
- a) Describe uses of fossils.
 - b) Describe mode of preservation of fossil.

Seat No.	
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Set **P**

B.Sc. (Semester - IV) (Old) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Paper – VIII)
Industrial Microbiology (19201426)

Day & Date: Friday, 03-05-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams give equations wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 Multiple choice questions:**08**

- 1) Industrial cultures are maintained by _____ process.
 - a) Incubation
 - b) Lyophilisation
 - c) Pasteurization
 - d) Sterilization
- 2) _____ is not used as Nitrogen source in fermentation medium.
 - a) Molasses
 - b) Soyabean meal
 - c) Peptone
 - d) Pharmamedia
- 3) Approximately _____% sugar is present in cane molasses.
 - a) 10
 - b) 80
 - c) 20
 - d) 50
- 4) Vortex formation during fermentation process is prevented by _____.
 - a) Baffles
 - b) Spargers
 - c) Impellers
 - d) Antifoam agents
- 5) Zone of growth inhibition is found in primary screening of _____producers.
 - a) Enzyme
 - b) Organic acid
 - c) Antibiotic
 - d) Growth factor
- 6) _____ processing is nothing but the purification and recovery of product after fermentation.
 - a) Upstream
 - b) Middle stream
 - c) End
 - d) Down stream
- 7) Temperature between _____ oC is maintained during bacterial amylase production.
 - a) 10-15
 - b) 15-20
 - c) 20-25
 - d) 25-30
- 8) Water coils around the fermenter are used to maintain the _____ of fermentation medium.
 - a) pH
 - b) Water level
 - c) Viscosity
 - d) Temperature

Q.2 Answer any Four of the following.**08**

- a) Define crude media.
- b) What is advantage of Strain improvement?
- c) Give four names of industrially important organisms?
- d) What is Lyophilisation?
- e) What is SCP?
- f) What are the inoculum media?

- Q.3 Write short notes on any Two of the following. 08**
- a) Primary Screening of Antibiotic producers.
 - b) Dual and multiple fermentation.
 - c) Recovery by Precipitation and distillation.
- Q.4 Answer any Two of the following. 08**
- a) Describe in detail alcohol fermentation.
 - b) Describe in brief various raw materials used for designing of fermentation media.
 - c) Describe the various method for preservation of Industrially important organisms.
- Q.5 Answer any One of the following. 08**
- a) Discuss in detail Penicillin production.
 - b) Describe with diagram Design of fermenter and its applications.

Seat No.	
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Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
ENGLISH (Compulsory)
Literary Mindscapes - I (19201500)

Day & Date: Friday, 05-04-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

Q.1 Choose the correct option from the given alternatives and complete the sentence. **08**

- 1) Della bought _____ as a gift to Jim in the story 'The Gift of the Magi'.
 - a) a gold watch
 - b) A jacket
 - c) Platinum fob chain for his watch
 - d) Silver chain
- 2) Phatik's deepest desire _____ in the story 'The Home Coming'.
 - a) to belong and be loved
 - b) to be a gang leader
 - c) to be a boatsman
 - d) to become a teacher
- 3) The girl in the poem 'The Solitary Reaper' used the _____ instrument.
 - a) axe
 - b) spade
 - c) knife
 - d) sickle
- 4) Queen Gulnaar desired for _____ in the poem 'The Queen's Rival'.
 - a) a rival
 - b) more clothes
 - c) more jewellery
 - d) King's love
- 5) The schoolmaster lived in a _____ in the poem 'The Village Schoolmaster'.
 - a) mansion
 - b) cottage
 - c) bungalow
 - d) apartment
- 6) The road in the poem 'The Road Not Taken' diverged _____.
 - a) on the green road
 - b) on the brown road
 - c) in the gray road
 - d) in the yellow wood
- 7) She will finish her project in a week. (Change the sentence from active into passive voice)
 - a) Her project will be finished in a week.
 - b) She finishes her project in a week.
 - c) She is going to finish her project in a week.
 - d) She needs a week to finish her project.
- 8) I was so _____ that I could not even have my dinner. (Choose the correct phrasal verb)
 - a) tied up
 - b) tied in
 - c) tied down
 - d) tied on

- Q.2 Write answers in short. (Any Four)** **12**
- a) How did the couple feel about their prized possessions in the story 'The Gift of The Magi'?
 - b) Describe The character of Phatik's from the story 'The Homing Coming'.
 - c) Describe the use of nature and harmony in the poem 'The Solitary Reaper'.
 - d) Why is the Queen unsatisfied and seeks a rival?
 - e) How did the villagers regard the Schoolmaster?
 - f) What is the significance of the roads in the poem 'The Road Not Taken'?
- Q.3 Answer the following questions. (Any One)** **10**
- a) You were in a situation where communication issues led to your poor performance in the organization. How did you recognize the issue and solve it?
 - b) You have been selected as the leader for a project which has people from diverse backgrounds working together for the first time. How will you help the group members to break the ice and brain storm about the project, as well as delegate responsibility among the team to ensure that the project gets completed on time.
- Q.4 What are the benefits of 21st Century technology?** **10**

Seat No.	
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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
PHYSICS (Special Paper - IX)**

Mathematical Physics & Statistical Physics (19201511)

Day & Date: Sunday, 12-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Multiple Choice Questions.

10

- 1) The order of differential equation $\frac{d^2y}{dx^2} = 6x$ is _____.
 - a) 1
 - b) 2
 - c) 3
 - d) 4
- 2) Curl of vector is the _____ line integral of the vector field per unit area.
 - a) maximum
 - b) minimum
 - c) constant
 - d) zero
- 3) The three co-ordinates in spherical co-ordinate system are _____.
 - a) (x, y, z)
 - b) (r, ϕ, θ)
 - c) (ρ, ϕ, z)
 - d) (x, r, ϕ)
- 4) Which of the following have dimensions of area _____.
 - a) h_2u_2
 - b) $h_1u_1h_2u_2$
 - c) h_2h_2
 - d) $h_1u_1h_2u_2h_3u_3$
- 5) Volume of a cell in phase-space is _____.
 - a) h
 - b) h^2
 - c) h^3
 - d) h^4
- 6) The condition for most probable distribution is given by _____.
 - a) $\delta \log W = 0$
 - b) $W = 0$
 - c) $\log W = 0$
 - d) $\log W = 1$
- 7) Maxwell Boltzmann statistics is applicable to _____.
 - a) He atoms
 - b) Bosons
 - c) Electrons
 - d) gas molecules
- 8) Thermodynamic potential at constant pressure is _____.
 - a) Helmholtz free energy
 - b) Enthalpy
 - c) Gibbs free energy
 - d) Entropy
- 9) In how many ways two particles can be arranged in three phase cells according to Bose- Einstein statistics?
 - a) 3
 - b) 6
 - c) 9
 - d) 27

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper - IX)
Physical Chemistry (19201506)

Day & Date: Sunday, 12-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to right indicate full marks.
 3) Neat diagrams must be drawn whenever necessary.
 4) Use of logarithmic table/scientific calculator is allowed.

Q.1 A) Choose correct alternative from given options and rewrite the sentence. 10

- 1) Lead-silver system is an example of _____ system.
 a) one component b) two component
 c) three component d) all the three
- 2) The dotted line in the phase diagram represents _____ equilibrium.
 a) True b) Metastable
 c) Real d) most stable
- 3) In phase diagram the triple point is called _____ point.
 a) Invariant b) Monovariant
 c) Univariant d) Bivariant
- 4) In the photosynthesis process _____ acts as sensitizer.
 a) Water b) Oxygen
 c) Chlorophyll d) Carbon dioxide
- 5) The wavelength range 400 nm to 750 nm belongs to _____ region.
 a) UV b) Visible
 c) IR d) all of these
- 6) The quantity $(2S+1)$ is known as _____.
 a) spin pairing b) spin multiplicity
 c) spin of electron d) rotation of electron
- 7) In concentration cell emf is produced due to decrease in _____.
 a) Free energy b) Temperature
 c) Pressure d) Concentration
- 8) $\text{Cu}^{2+} / \text{Cu}_{(s)}$ represents _____ electrode.
 a) amalgam b) metal-metal ion
 c) metal insoluble salt d) oxidation-reduction
- 9) The unit for cell potential is _____.
 a) faraday b) joules
 c) volt d) ergs
- 10) _____ equation is known as de Broglie equation.
 a) $\lambda = h/mv$ b) $\lambda = h/mc$
 c) $\lambda = mvr$ d) $\lambda = hv$

- B) Answer in short/Fill in the blanks/ One Word answer/True or False. 06**
- 1) In phase diagram of water system curves are invariant systems. (True/False)
 - 2) Define congruent melting point in salt-water system.
 - 3) Give one example of reversible cell.
 - 4) Give the representation of calomel electrode.
 - 5) In photosynthesis process _____ acts as photosensitizer.
 - 6) Black body is perfect absorber and emitter. (True/False)

Q.2 Solve any Eight of the following. 16

- 1) What do you mean by electrochemical series?
- 2) What is cryohydric point?
- 3) Explain oxidation-reduction electrode.
- 4) What is luminescence?
- 5) How emf of the cell is used to calculate Gibbs free energy change?
- 6) What is polymorphism?
- 7) What is mathematical equation for phase rule?
- 8) What are thermal reactions?
- 9) What is Heisenberg's uncertainty principle?
- 10) Define the term photoelectron.

Q.3 A) Attempt any Two of the following. 10

- 1) Write a note on Pattinson's process for desilverization of lead.
- 2) Give a brief account on photosensitized reactions.
- 3) Discuss the application of emf measurement in the determination of pH of solution.

B) Solve the following. 06

What is photoelectric effect? Give its characteristics.

Q.4 A) Attempt any Two of the following. 08

- 1) Write a note on Compton Effect.
- 2) What is photochemical equilibrium? Explain with respect to photodimerization of anthracene?
- 3) Define the term triple point. Explain with example of water system.

B) Solve the following. 08

How will you determine equilibrium constant from cell emf? Calculate the value of equilibrium constant for the cell reaction in Daniel cell at 298 K



Q.5 Attempt any Two of the following. 16

- a) What are concentration cells? Explain in detail electrolyte concentration cell with suitable example.
- b) State and explain the law of photochemical equivalence. What are the reasons for high and low quantum yield?
- c) What is transition temperature? Discuss in detail the application of phase rule to Sulphur system.

- B) Give the Definition of following. 06**
- 1) Define mesophytes.
 - 2) Define inflorescence.
 - 3) Define the Species Concept.
 - 4) What is meant by herbarium?
 - 5) Give full form of APG.
 - 6) Give the botanical name of custard apple.
- Q.2 Solve any Eight of the following. 16**
- 1) Define foliar roots with suitable example.
 - 2) Describe bulb with suitable example.
 - 3) What is meant by true fruit?
 - 4) What is meant by parthenocarpic fruit?
 - 5) Enlist any two herbaria of India.
 - 6) What is meant by the botanical garden?
 - 7) Enlist the types of classification.
 - 8) Mention a plant of economic importance from family Rutaceae.
 - 9) Give the economic use of family POACEAE.
 - 10) What are the accessory whorls?
- Q.3 A) Attempt any Two of the following. 10**
- 1) Describe modification of roots for vital functions.
 - 2) Describe the forms of polypetalous corolla with suitable example.
 - 3) Describe the role of the Botanical Garden.
- B) Give the salient features of Bentham and Hooker's Classification. 06**
- Q.4 A) Attempt any Two of the following. 08**
- 1) Write on Indian Botanical Garden Kolkata.
 - 2) Give merits and demerits of Bentham and Hooker's System.
 - 3) Mention the plants of economic importance from family Lamiaceae.
- B) Give the distinguishing characteristics of any two families and add an economically important plant with use from the below families. 08**
- 1) RUBIACEAE
 - 2) BIGNONIACEAE
 - 3) LAMIACEAE
 - 4) NYCTAGINACEAE
- Q.5 Attempt any Two of the following. 16**
- a) Describe the types of placentation with diagrams.
 - b) Write on Lead Botanical Garden.
 - c) Identify any four plants to their respective family and add economic importance to it.
 - 1) *Polyalthia longifolia*
 - 2) *Abutilon indicum*
 - 3) *Bougainvillea glabra*
 - 4) *Vanda roxburghii*

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
Zoology (Special Paper - IX)
Molecular Biology (19201520)

Day & Date: Sunday, 12-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams wherever necessary.
 3) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. 10

- 1) Single strand of mRNA attached to complex of ribosomes is called _____.
 a) Okazaki fragments b) Polymer
 c) Polysome d) Polypeptide
- 2) A DNA sequence is read by an RNA polymerase that produces complementary antiparallel RNA strand known as _____.
 a) Hexa transcript b) secondary transcript
 c) primary transcript d) tertiary transcript
- 3) The Golden Rice variety is rich in _____.
 a) Vitamin C b) B-carotene and ferritin
 c) Biotin d) Lysine
- 4) A DNA sequence is read by an RNA polymerase that produces complementary antiparallel RNA strand known as _____.
 a) Hexa transcript b) secondary transcript
 c) primary transcript d) tertiary transcript
- 5) The 3' end of an intron is marked by _____.
 a) Donor site b) Acceptor site
 c) AT rich site d) Branch point site
- 6) Termination of replication is triggered by _____.
 a) DNA polymerase b) Helicase
 c) SSB d) Tus protein
- 7) During splicing which of the following sites is not recognized by the spliceosome _____.
 a) Donor b) Branch point
 c) Acceptor d) G-rich site
- 8) _____ bacterium is used in the production of insulin by genetic engineering.
 a) *Agrobacterium* b) *Rhizobium*
 c) *Escherichia* d) *Mycobacterium*
- 9) In both prokaryotic and eukaryotic cells, the synthesis of protein chains is initiated with _____.
 a) Arginine b) Methionine
 c) Serine d) Valine
- 10) The synthesis of RNA from DNA is _____.
 a) Translation b) Metabolism
 c) Transcription d) reduction

- B) Give Definition** **06**
- 1) DNA replication
 - 2) Translation
 - 3) Splicing
 - 4) Gene regulation
 - 5) Transcription
 - 6) Recombinant DNA

- Q.2 Solve any eight of the following.** **16**
- 1) Describe mismatch pair
 - 2) Explain Wobble hypothesis.
 - 3) Describe steps of PCR.
 - 4) Explain genetic code.
 - 5) Explain the DNA repair mechanism.
 - 6) Define RNA polymerase.
 - 7) Explain initiation of transcription mechanism.
 - 8) Explain RNA interference.
 - 9) Explain replication of circular DNA.
 - 10) Describe DNA fingerprinting.

- Q.3 A) Attempt any two of the following.** **10**
- 1) Describe Lac Operon.
 - 2) Define mechanism capping.
 - 3) Explain difference between prokaryotic and eukaryotic translation.

- B) Short note.** **06**
- SOS mechanism of DNA repair.

- Q.4 A) Attempt any two of the following.** **08**
- 1) Describe properties of genetic code.
 - 2) Explain properties of cloning vector.
 - 3) Explain RNA structure.

- B) Describe semi conservative mechanism of DNA replication.** **08**

- Q.5 Attempt any two of the following.** **16**
- a) Explain Watson and Crick model of DNA.
 - b) Describe mechanism of transcription in prokaryotes.
 - c) Describe steps in recombinant DNA technology and its application.

- 9) Which of the following is incorrect?
 a) $\langle cx, y \rangle = c \langle x, y \rangle$ b) $\langle \overline{x}, \overline{y} \rangle = \langle y, x \rangle$
 c) $\langle x, x \rangle \geq 0, x = 0$ d) $\langle x + z, y \rangle = \langle x, y \rangle + \langle z, y \rangle$
- 10) If $x = (2,1,2) \in V_3(R)$ then unit vector is _____.
 a) $(2/3, 1/3, 2/3)$ b) $(2/\sqrt{3}, 1/\sqrt{3}, 2/\sqrt{3})$
 c) $(2/5, 1/5, 2/5)$ d) $(2/\sqrt{5}, 1/\sqrt{5}, 2/\sqrt{5})$

B) Fill in the blanks with suitable answer.

06

- 1) An element x in a ring R is idempotent if _____.
- 2) The vector space f^n has dimension _____ (n).
- 3) Let U and V be vector space with $\dim U = \dim V = 5$ then $L(U, V)$ is of dimension _____.
- 4) $T: R^3 \rightarrow R^2$ is linear transformation defined by $T(a_1, a_2, a_3) = (a_1 - a_2, a_3)$ then $N(T) =$ _____.
- 5) Determine trace of $\begin{bmatrix} 10 & 0 & -8 \\ 2 & -4 & 3 \\ -5 & 7 & 6 \end{bmatrix}$ _____.
- 6) If $x = (2, 1 - i, i)$ and $y = (-2, 1 + i, -i)$ then $\|x + y\| =$ _____.

Q.2 Attempt any eight of the following.

16

- a) Define ring with zero divisor.
- b) If R is ring then prove that $a(-b) = -(ab) = -a(b)$.
- c) If x, y, z are vector in vector space V such that $x + z = y + z$ then show that $x = y$ (Cancellation Law).
- d) Determine whether first vector can be written as linear combination of other two vectors $(-2, 0, 3)$ $(1, 3, 0)$ $(2, 4, -1)$.
- e) Show that the set $S = \{(1, 2)$ $(3, 4)\}$ is linearly independent.
- f) Show that $w = \{(y, 0, 0) : y \in R\}$ is subspace of the vector space R^3 .
- g) Prove that $\|cx\| = |c| \|x\|$
- h) Let V be inner product space over F then show that $\|x + y\|^2 = \|x\|^2 + \|y\|^2$
- i) Show that mapping T is non linear $T: V_2 \rightarrow V_2$ defined by $T(a_1, a_2) = (1, a_2)$
- j) Let α and β be the standard ordered basis and $T: R_2 \rightarrow R_3$ defined by $T(a_1, a_2) = (2a_1 - a_2, 3a_1 + 4a_2, a_1)$ Compute $[T]_{\beta}^{\alpha}$.

Q.3 A) Attempt any two of the following.

10

- 1) Show that intersection of two left ideals of R is left ideal of R .
- 2) Determine whether the following set of polynomial is linearly dependent or linearly independent.
 $S = \{x^3 + 2x^2, -x^2 + 3x + 1, x^3 - x^2 + 2x - 1\}$
- 3) If $T: R_2 \rightarrow R_3$ is linear transformation $T(1, 1) = (1, 0, 2)$
 $T(2, 3) = (1, -1, 4)$ What is $T(8, 11)$.

- B)** Let v be the vector space over f prove that polar identities for all $x, y \in v$ **06**

$$\langle x, y \rangle = \frac{1}{4} \|x + y\|^2 - \frac{1}{4} \|x - y\|^2$$

- Q.4 A) Attempt any two of the following.** **08**

- 1) Let W_1 and W_2 be subspace of vector V then show that $W_1 + W_2$ is also subspace.
- 2) Prove that every field is an integral domain.
- 3) Let v be inner product space over f then for all $x, y \in v$ and $c \in f$ then show that triangles inequality $\|x + y\| \leq \|x\| + \|y\|$

- B)** Let $U: P_3(R) \rightarrow P_2(R)$ and $T: P_2(R) \rightarrow P_3(R)$ be linear transformation defined **08**

by $U[F(x)] = f'(x)$ and $T[f(x)] = \int_0^x f(t)dt$ Let α and β be the standard ordered bases of $P_3(R)$ and $P_2(R)$. Compute

- 1) $[T]_{\beta}^{\alpha}$
- 2) $[U]_{\alpha}^{\beta}$

- Q.5 Attempt any two of the following.** **16**

- a) State and prove Cauchy-Schwarz Inequality.
- b) Let V and W be vector space and let $T: V \rightarrow W$ be linear. If V is finite dimensional then show that $\text{nullity}(T) + \text{rank}(T) = \dim(V)$.
- c) If $Z_6 = \{0,1,2,3,4,5\}$ with $+_6$ and \times_6 operations then prove that $(Z_6, +_6, \times_6)$ is commutative ring with unit element.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper - IX)
Statistical Inference - I (19201528)

Day & Date: Sunday, 12-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Multiple Choice Questions.

10

- 1) The types of estimates are _____.
 - a) Point estimate
 - b) Interval estimate
 - c) Estimation of confidence region
 - d) all the above
- 2) Neyman's factorisation criterion is applied for testing _____.
 - a) Sufficiency of an estimator
 - b) Consistency of an estimator
 - c) Unbiasedness of an estimator
 - d) Efficiency of an estimator
- 3) Bias of an estimator can be _____.
 - a) Positive
 - b) Negative
 - c) Either positive or negative
 - d) Always Zero
- 4) Which one of the following is unique estimator?
 - a) Unbiased
 - b) Biased
 - c) U.M.V.U.E.
 - d) Sufficient
- 5) By method of moments one can estimate:
 - a) All constant of a populations
 - b) Only mean and variance of a distribution
 - c) All moments if a population distribution
 - d) None of the above
- 6) The estimator $\frac{\sum X_i}{n}$ of population mean is _____.
 - a) An Unbiased estimator
 - b) An Consistent estimator
 - c) An biased estimator
 - d) both a and b
- 7) An estimator is considered to be best if its distribution is _____.
 - a) Continuous
 - b) Discrete
 - c) Concentrated about the true parameter value
 - d) Normal

- 8) If the expected value of an estimator is not equal to it's parametric function, it is said to be a _____.
 a) Unbiased estimator b) Biased estimator
 c) Consistent estimator d) None of the above
- 9) Method of minimum Chi-Square of the estimation of parameters utilised:
 a) Chi-square distribution function
 b) Pearson's Chi-square statistic
 c) Contingency table
 d) All of the above
- 10) The M.L.E, of Exponential distribution based a random sample of size n given by _____.
 a) sample mean b) sample median
 c) $X_{(n)}$ d) $X_{(1)}$

B) Fill in the blanks.

06

- 1) If X_1, X_2, \dots, X_n is a random sample from $U(\theta, 0)$ then sufficient statistic of θ _____.
- 2) If T_1 and T_2 be two unbiased estimator of θ . The estimator T_1 is said to be more efficient than estimator T_2 if _____.
- 3) If statistic T is unbiased estimator of parameter θ then unbiased estimator of $4\theta + 7$ is _____.
- 4) If an Estimator T_n of population parameter θ converges in probability to θ as n tends to infinity is said to be _____.
- 5) The denominator in the Crammer-Rao inequality is known as _____.
- 6) Let 5, 8, 3, 6, 8 are observations from Poisson (λ) then unbiased estimate of λ is _____.

Q.2 Solve any Eight of the following.

16

- a) Define a statistic and give one example.
- b) Define consistent estimator.
- c) State Neyman - factorization theorem.
- d) Define likelihood function of a random variable X_1, X_2, \dots, X_n from Poisson distribution with parameter θ .
- e) Define a sample and a population,
- f) Define a biased estimator and unbiased estimator,
- g) Define information function $I(\theta)$ of parameter θ .
- h) State any two properties of Maximum Likelihood Estimator (MLE).
- i) What are the requirements of good estimator?
- j) Distinguish between an estimator and estimate.

- Q.3 A) Attempt any Two of the following. 10**
- 1) Let X_1, X_2, \dots, X_n be iid r.v. with Poisson distribution with parameter λ then find Sufficient statistic for λ .
 - 2) Explain the procedure of obtaining the estimate of the parameters by method of maximum likelihood estimator.
 - 3) State and prove sufficient condition for consistency for θ .
- B) Let X_1, X_2, \dots, X_n be a r.s. from $U(a, b)$ distribution. Find the estimators of a and b by the Method of moments. 06**
- Q.4 A) Attempt any Two of the following. 08**
- 1) Obtain the MLE of the parameter θ based on a r.s. of size n from Binomial Distribution.
 - 2) Prove that two distinct unbiased estimators of $\phi(\theta)$ give rise to infinitely many Unbiased estimators of $\phi(\theta)$.
 - 3) Let X_1, X_2, \dots, X_n be a r.s. from $N(\theta, \sigma^2)$ distribution. Show that the sample mean square S^2 is consistent estimator of σ^2 .
- B) Let X_1 and X_2 is a r.s. from $P(\theta)$ distribution let $T_1 = \frac{X_1+X_2}{2}, T_2 = \frac{X_1+2X_2}{3}$ 08**
- Show that T_1 and T_2 are unbiased estimator of μ and also find the efficiency of T_2 in relative to T_1 .
- Q.5 Attempt any Two of the following. 16**
- a) State and prove Crammer - Rao Inequality.
 - b) Let X_1, X_2, \dots, X_n denote the random sample from exponential distribution with pdf

$$f(x, \theta) = \begin{cases} \theta e^{-\theta x} & ; \quad x > 0, \theta > 0 \\ 0 & ; \quad \text{otherwise} \end{cases}$$
 - 1) Obtain expression for likelihood function
 - 2) Find Fisher information $I(\theta)$.
 - c) State and prove Uniqueness theorem for UMVUE.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Special Paper - IX)
Economic Geology (19201534)**

Day & Date: Sunday, 12-05-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions.**10**

- 1) The non-metallic minerals associated with ore minerals are called _____.
a) Non-metallic minerals b) Metallic minerals
c) Gangue minerals d) Flux minerals
- 2) Supergene sulphide enrichment zone is found _____.
a) Above the water table b) Below the water table
c) Near the ground surface d) In oxidizing zone
- 3) An assemblage of high temperature metamorphic gangue minerals in contact metasomatic deposits is called _____.
a) Skarn b) Gondite
c) Gossans d) Bar deposits
- 4) In _____ deposits 'insitu' gravitational accumulation is the process of its formation.
a) Eluvial b) Alluvial
c) Hydrothermal d) Placer
- 5) Hydrothermal mineralisation along the crests of anticlines.
a) Stock works b) Saddle reefs
c) Ladder veins d) Gash veins
- 6) Diamond is an example of _____ magmatic deposits.
a) disseminated b) segregated
c) injected d) none of these
- 7) The Mn-ore deposits of M.P. and Maharashtra are confined to the:
a) Chorbaoli formation b) Mansar formation
c) Lohangi formation d) Bochum formation
- 8) Chrysolite asbestos result from the _____.
a) Magmatic liquid
b) Alteration of olivine to serpentine
c) Alteration of serpentine
d) Hydrothermal solutions
- 9) Which of the following ore deposits is example of early magmatic deposits?
a) Chromite b) Sulphide
c) Diamond d) Asbestos

- 10) Generally tourmaline-rich rocks are products of _____.
a) Metamorphism
b) Metasomatism
c) Magmatic crystallization
d) Oxidation and supergene enrichment

B) Fill in the blanks: 06

- 1) The deposits that have formed simultaneously with the enclosing rock are called _____.
- 2) The ferric hydroxide is left behind to form a residual deposit at the surface and this is known as a _____.
- 3) _____ deposits are formed in intruded rocks by fluids given off by intruding igneous magmas.
- 4) Copper - Nickel sulphide mineralization is generally associated with the rocks of _____ nature.
- 5) Laterite and bauxite are the examples of _____ type of deposits.
- 6) The Singhbhum copper belt located in _____ state.

Q.2 Solve any eight of the following: 16

- a) Define Epigenetic ore deposits.
- b) Give essential conditions for the placer deposits.
- c) Give two examples of hydrothermal deposits.
- d) Name two endogenous deposits associated with folded regions.
- e) What are non -metalliferous mineral deposits?
- f) Name the types of magmatic concentration.
- g) Give the Indian examples of copper deposits.
- h) Name any two ore deposits from by residual concentration.
- i) Define Tenor of ore.
- j) Define Syngenetic deposits.

Q.3 A) Attempt any two of the following: 10

- 1) Explain the oxidation and supergene enrichment processes of ore deposit with Indian example.
- 2) What is Magmatic concentration? Explain late magmatic concentration deposits.
- 3) Discuss the manganese deposits of India.

B) Write short note on contact metamorphism process with suitable diagram. 06

Q.4 A) Attempt any two of the following: 08

- 1) Explain the formation of residual deposits.
- 2) Discuss the metallogenic epoch and metallogenic provinces.
- 3) Write a note on Kolar gold deposits.

B) Describe in brief Hydrothermal ore deposits and its types with suitable diagram. 08

Q.5 Attempt any two of the following: 16

- a) Describe in brief the coal deposits of India.
- b) Discuss in detail the mechanical concentration of ore deposits with suitable example.
- c) Explain the concept and need of conservation of minerals, give examples.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Special Paper - IX)
Virology (19201539)

Day & Date: Sunday, 12-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagrams whenever necessary.
 3) Figures to right indicate full marks.

Q.1 A) Rewrite the following sentences by selecting correct answers from given alternatives. 10

- 1) _____ is viral nucleic acid integrated in host genome.
 - a) Prion
 - b) Provirus
 - c) Viriod
 - d) VLP
- 2) Outer protein coat of virus is called _____.
 - a) Capsid
 - b) Capsule
 - c) Protectant
 - d) Cell wall
- 3) The viruses that can remain latent for many years are most likely _____ viruses.
 - a) Toga
 - b) Entero
 - c) Rhino
 - d) Herpes
- 4) Bacteriophages are counted by the process of _____ assay.
 - a) Diffusion
 - b) Turbidometric
 - c) Plaque
 - d) Enzymatic
- 5) The viruses that cause or give rise tumours are called _____.
 - a) Oncogenic
 - b) Latent
 - c) Avirulent
 - d) Nonpathogenic
- 6) _____ is helical virus.
 - a) T4
 - b) Poxvirus
 - c) Herpes
 - d) TMV
- 7) Infectious RNA particles without protein coat are called _____.
 - a) Capsid
 - b) Prion
 - c) Viriod
 - d) Virion
- 8) Cauliflower mosaic virus contains _____.
 - a) dsDNA
 - b) ssDNA
 - c) dsRNA
 - d) ssRNA
- 9) Viruses are cultivated by using _____.
 - a) Nutrient agar
 - b) MacConkeys agar
 - c) Peptone water
 - d) Living cell culture
- 10) Viruses are connecting link between _____.
 - a) Bacteria and protozoa
 - b) Living and non-living
 - c) Rickettsia and actinomycetes
 - d) Bacteria and fungi

- B) Fill in the blanks.** **06**
- 1) _____ are obligatory intracellular parasites.
 - 2) _____ is host for coliphagcs.
 - 3) _____ virus is first detected oncogenic virus.
 - 4) Viruses that contain host DNA instead of viral DN A are called _____.
 - 5) The embryonated hens' egg was firstly used for viral cultivation by _____.
 - 6) _____ is first step of infection of bacterial cell by phage.

- Q.2 Solve any eight of the following.** **16**
- a) Define Lytic cycle?
 - b) Give the two examples of oncogenic viruses?
 - c) What is chemical composition of Capsid?
 - d) What are the Temperate Phages?
 - e) Who discovered virus firstly?
 - f) Which system is used for classification of Viruses?
 - g) Which type of nucleic acid is present in Influenza virus.
 - h) Who described one step growth curve?
 - i) What is meaning of Virulent phages?
 - j) Why the viruses cannot multiply their own?

- Q.3 A) Attempt any two of the following.** **10**
- 1) General structure of viruses
 - 2) Enumeration of viruses
 - 3) Characteristic of cancerous cells

- B) Describe one step growth curve.** **06**

- Q.4 A) Attempt any two of the following.** **08**
- 1) Reproduction of Adenoviruses
 - 2) TMV
 - 3) Viral classification

- B) Describe in detail Lytic cycle.** **08**

- Q.5 Attempt any two of the following.** **16**
- a) Prevention and control of plant viral diseases.
 - b) Describe in detail Isolation, cultivation and purification of viruses.
 - c) Describe in detail viriods and prions.

- 8) The frequency at which the gain of filter is either minimum or maximum is called as _____.
 a) high cut of frequency b) low cut of frequency
 c) center frequency d) none of these
- 9) _____ IC is specially designed for Sample and Hold purpose.
 a) LM 324 b) LM 741
 c) LF 565 d) LF 398
- 10) _____ process is used for growing a single crystal silicon structure upon an original silicon substrate.
 a) Oxidation b) Epitaxial
 c) Ion Implantation d) Lithography

- B) Define the following. 06**
- 1) Hybrid IC
 - 2) Precision rectifier
 - 3) order of filter
 - 4) Line regulation
 - 5) Capture Range
 - 6) Active clamper

- Q.2 Solve any Eight of the following. 16**
- a) Define Integrated circuit.
 - b) Draw the diagram of full wave precision rectifier.
 - c) State the advantages of active filter.
 - d) State important features of the IC regulators.
 - e) Define voltage controlled oscillator.
 - f) Calculate the value of IC resistance having sheet resistance of $100 \Omega / \text{sq.}$ and has aspect ratio $L:W=40:1$
 - g) Calculate cut off frequency of second order Low pass filter if $R_1 = R_2 = 1 \text{ K}\Omega$ and $C_1 = C_2 = 0.1 \mu\text{F}$.
 - h) Draw the diagram of sample and hold circuit.
 - i) Define cut off frequency filter.
 - j) Define free running frequency of PLL.

- Q.3 A) Attempt any Two of the following. 10**
- 1) Explain Butterworth second order low pass filter.
 - 2) Explain the fabrication process of capacitor in IC.
 - 3) With suitable diagram explain the working of active clipper.

- B) Describe functional block diagram of phase lock loop. 06**

- Q.4 A) Attempt any Two of the following. 08**
- 1) Explain the working of series Op-Amp regulator.
 - 2) Explain V to F converter using IC LM331.
 - 3) Explain working of active clipper circuit.

- B) Explain the functional block diagram of voltage regulator. 08**

- Q.5 Attempt any Two of the following. 16**
- a) Explain PLL IC 565 as a frequency multiplier.
 - b) With suitable diagram explain band pass filters.
 - c) Explain in brief the steps involved in the fabrication of the IC.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Special Paper - IX)
Visual Programming Using C# (19201543)

Day & Date: Sunday, 12-05-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Multiple choice questions. 10

- 1) What is String.Length in C#?
 - a) Property
 - b) Method
 - c) Constructor
 - d) Both a and b
- 2) By default Priority of thread is _____.
 - a) Highest
 - b) Normal
 - c) above normal
 - d) below normal
- 3) Two method with same name and same parameters is known _____.
 - a) Overloading
 - b) Multiplexing
 - c) Overriding
 - d) Loading
- 4) C# does not support _____.
 - a) Abstraction
 - b) Polymorphism
 - c) multiple inheritance
 - d) Inheritance
- 5) Two method with same name but different parameters is known as _____.
 - a) Overloading
 - b) Multiplexing
 - c) Duplexing
 - d) Loading
- 6) _____ is necessary condition to implement delegate.
 - a) inheritance
 - b) class declaration
 - c) exception
 - d) multithreading
- 7) Which of these keywords is not a part of exception handling?
 - a) try
 - b) throw
 - c) thrown
 - d) catch
- 8) Choose the keyword which declares the indexer?
 - a) base
 - b) this
 - c) super
 - d) extract
- 9) Which of the keyword is used for the block to be examined for exceptions?
 - a) try
 - b) catch
 - c) throw
 - d) check
- 10) The _____ are the graphical user interface (GUI) components created for User interaction.
 - a) Web form
 - b) Window Form
 - c) Application Form
 - d) None of these

- B) Fill in the blanks.** **06**
- 1) _____ is a collection of similar data which is stored in continuous memory addresses.
 - 2) _____ is used to import namespaces at the top of a source code file in C#.
 - 3) CTS stands for _____.
 - 4) The _____ block execute whether an exception is thrown or not thrown.
 - 5) _____ parameters are used to pass result back to the calling function.
 - 6) _____ Class of System.IO namespace is used to write text or sequential series of characters into file.

- Q.2 Solve any Eight of the following.** **16**
- a) What is delegate? Write types of Delegate.
 - b) Write a note of CLR.
 - c) What is the namespace?
 - d) What is function parameter?
 - e) What is menu?
 - f) What is Assembly?
 - g) Define inheritance.
 - h) What is Garbage Collection?
 - i) What is MDI application?
 - j) Define Event.

- Q.3 A) Attempt any Two of the following.** **10**
- 1) Write program to demonstrate abstract class and abstract method.
 - 2) Explain Thread synchronization.
 - 3) Write a program for function overriding.

- B) Explain types of inheritance.** **06**

- Q.4 A) Attempt any Two of the following.** **08**
- 1) Explain multiple catch block with example.
 - 2) What is indexer? Explain with example.
 - 3) Explain multicast delegate with example.

- B) Explain operator overloading with example.** **08**

- Q.5 Attempt any Two of the following.** **16**
- a) Write a program to demonstrate multiple interface.
 - b) Explain Button control with example.
 - c) Explain dotnet framework in detail.

Q.5 Attempt any two of the following.

- a) Discuss seven crystal systems of Bravais lattices in three dimensions. Calculate packing fraction for simple cubic (SC) crystal structure.
- b) Draw and explain the experimental arrangement and traces obtained in powder method of X-ray diffraction. In a simple cubic crystal with lattice parameter $a = 2.816 \text{ \AA}$. the first order diffraction is observed from the plane (1 0 0) using X-rays of wavelength 1.5 \AA . Calculate the angle of diffraction.
- c) Discuss classification of magnetic materials.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper - X)
Inorganic Chemistry (19201507)

Day & Date: Wednesday, 10-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Select the most correct alternative.**10**

- 1) Uranium - 238 is a _____.
 a) non-radioactive element b) man made element
 c) fertile nuclear fuel d) fissile nuclear fuel
- 2) Nuclear fusion is also known as a _____ reaction.
 a) chain b) thermonuclear
 c) artificial d) projectile capture
- 3) The geometry of deoxyhaemoglobin is _____.
 a) tetrahedral b) octahedral
 c) square planer d) square planer pyramidal
- 4) The main function of myoglobin is _____.
 a) store O₂ b) store CO₂
 c) transport O₂ d) transport CO₂
- 5) The oxidation of oxalic acid by KMnO₄ is an example of _____ catalysis.
 a) induced b) positive
 c) auto d) negative
- 6) The catalyst used in the manufacture of H₂SO₄ by contact process is _____.
 a) Ni b) V₂O₅
 c) Al₂O₃ d) Zn - Cu couple
- 7) Zinc is associated with Iron and Manganese for the synthesis of _____.
 a) proteins b) amino acid
 c) pigments d) chlorophyll
- 8) The fertilizers produced by mixing of several nutrients by chemical reaction are known as _____ fertilizers.
 a) micro b) mixed
 c) nitrogenous d) complex
- 9) According to MOT, in octahedral complexes _____ orbitals are non-bonding orbitals.
 a) a_{1g} b) t_{1u}
 c) t_{2g} d) e_g
- 10) Tetragonal complexes have additional stabilization over _____.
 a) tetrahedral b) regular octahedral
 c) square planer d) trigonal bipyramidal

- B) Fill in the blanks. 06**
- 1) $\Delta_t = \text{_____} \Delta_0$
 - 2) The isotope emitting radioactivity is called _____ isotope.
 - 3) ${}_{29}\text{Cu}^{63} + \text{_____} \rightarrow {}_{29}\text{Cu}^{64} + \gamma$
 - 4) A major metal present in human body is _____.
 - 5) The reaction in which reactants, catalyst and products are present in gaseous state is called _____ catalysis.
 - 6) Urea contains _____ % nitrogen.
- Q.2 Solve any eight of the following. 16**
- a) Give different shapes of d - orbitals.
 - b) What are limitations of CFT?
 - c) What is negative catalysis? Explain with example.
 - d) Give the function of calcium in living being.
 - e) What is projectile capture particle emission reaction?
 - f) Explain artificial transmutation.
 - g) What is chemical investigation using tracer technique?
 - h) What are advantages of complex fertilizers?
 - i) Mention any four types of fertilizers with example.
 - j) What are qualities of ideal fertilizers?
- Q.3 A) Attempt any two of the following. 10**
- 1) What crystal field splitting? Explain splitting in octahedral complexes with suitable example.
 - 2) Explain characteristics of catalytic reactions.
 - 3) Describe the nature of oxygen binding curves of haemoglobin and myoglobin.
- B) What is nuclear fission? Explain uncontrolled chain reaction. 06**
- Q.4 A) Attempt any two of the following. 08**
- 1) Explain Jahn-Teller Distortion theorem.
 - 2) What are the factors affecting crystal field splitting?
 - 3) Discuss the process of manufacture of Urea.
- B) What is catalysis? Explain adsorption theory of catalysis. Give any two industrial applications of catalysis. 08**
- Q.5 Attempt any two of the following. 16**
- a) Give the function, structure and working of haemoglobin.
 - b) What is a nuclear reaction? Discuss nuclear fusion reaction in detail.
 - c) On the basis of MO diagram compare $[\text{Co}(\text{NH}_3)_6]^{3+}$ complex with $[\text{Ni}(\text{NH}_3)_6]^{2+}$ complex.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
BOTANY (Special Paper - X)
Genetics (19201502)

Day & Date: Wednesday, 10-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions.

10

- 1) When F₁ hybrid is crossed with any parent it is called as _____ method.
 - a) back cross
 - b) test cross
 - c) both a and b
 - d) none of these
- 2) The phenotypic ration of Complementary genes is _____.
 - a) 9:7
 - b) 3:1
 - c) 9:9:3:1
 - d) All of these
- 3) The phenotypic ration of inhibitory genes is _____.
 - a) 13:3
 - b) 1:3
 - c) 3:1:2
 - d) 7:3
- 4) When two or more genes consistently inherited together is known as _____ linkage.
 - a) complete
 - b) incomplete
 - c) both a and b
 - d) none of these
- 5) Linkage theory proposed by T. H. Morgan in _____.
 - a) 1951
 - b) 1910
 - c) 1978
 - d) 1920
- 6) Pairing of homologous chromosomes is called as _____.
 - a) synapsis
 - b) duplication
 - c) translocation
 - d) inversion
- 7) The genes present in cytoplasm i.e. in plastid and mitochondrial are called as _____ genes.
 - a) nuclear
 - b) extranuclear
 - c) both a and b
 - d) none of these
- 8) The mitochondrial inheritance has been observed in unicellular fungus like _____.
 - a) Yeast
 - b) Mucor
 - c) Albugo
 - d) Rhizopus
- 9) Neurospora is the example of mitochondria inheritance was studied by _____.
 - a) M. N. Mitchel
 - b) M. S. Mitchel
 - c) M. M. Mitchel
 - d) M. B. Mitchel

- 10) _____ and Weinberg develop a simple mathematical method of analysing a frequency of alleles in population.
- a) Hardy
 - b) Nanir
 - c) Singh
 - d) All of these

B) Fill in the blanks of the following. 06

- 1) Term genetics first time used by Bateson in _____.
- 2) When F₁ hybrid is crossed with double recessive parent, it is called as _____.
- 3) When cross is taken in between same type of parent is called as _____.
- 4) An organism with identical alleles is known as _____.
- 5) Cross involving more than two pairs of contrasting characters is known as _____ cross.
- 6) On the basis of dihybrid cross _____ formulated the law of independent assortment.

Q.2 Solve any eight of the following. 16

- a) What is genetics?
- b) Define gene mutation.
- c) Write the two examples of chemical mutation.
- d) Define colorblindness.
- e) What is autosomes?
- f) Define linkage.
- g) What is coupling?
- h) Define holandric gene.
- i) What is repulsion?
- j) Define genosme.

Q.3 A) Attempt any Two of the following. 10

- 1) Explain the law of independent assortment studied by you.
- 2) Describe the Haemophilia with suitable example.
- 3) Explain the incomplete linkage with suitable example.

B) Write short notes. 06

Sex chromosome in man.

Q.4 A) Attempt any two of the following. 08

- 1) Describe the sex chromosome in drosophila.
- 2) Explain the colorblindness with suitable example.
- 3) Give the inhibitory genes with suitable example.

B) Attempt any one of the following 08

- 1) Explain the cytological proof of crossing over.
- 2) Write the supplementary genes with suitable example.

Q.5 Attempt any two of the following. 16

- a) Describe the Bridge experiment studied by you.
- b) Explain the Inheritance of mitochondrial genes with suitable example.
- c) Describe the Hardy-Weinberg studied by you.

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B.Sc. (Semester-V) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Special Paper – X)
Principles of Genetics (19201521)

Day & Date: Wednesday, 10-04-2023
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to right indicate full marks.
 3) Draw neat labelled diagrams wherever necessary.
 4) Use of log table and calculators is allowed.

Q.1 A) Select the correct alternative from the following.

10

- 1) _____ is the father of Genetics.
 - a) Mendel
 - b) Gregon
 - c) Tschrmare
 - d) Nine
- 2) Hereditary unit is known as _____.
 - a) Genes
 - b) Chromosomes
 - c) Allele
 - d) None
- 3) The linked genes which are middle located in chromosomes & are separated by crossing over is called as _____.
 - a) Incomplete gene
 - b) Complete gene
 - c) Interaction of gene
 - d) None of these
- 4) The phenomenon of phenotypic expression of characters by confirmed genes & not by a right dominant or recessive gene is called as _____.
 - a) Gene Interaction
 - b) Allele
 - c) Test Cross
 - d) None of these
- 5) _____ Scientist noticed a very interesting result during inheritance of comb type in fowls.
 - a) John Cotto
 - b) Gardener
 - c) Kuru
 - d) None of these
- 6) Gene is inherited from parents to the offsprings has phenotypic expression this is called _____.
 - a) Units of Heredity
 - b) Non allelic
 - c) Supplementary Gene
 - d) None of these
- 7) The phenomenon of inheritance of two or more genes are located on same Chromosomes togetherly called as _____.
 - a) Linkage
 - b) Crossing over
 - c) Multiple alleles
 - d) None of these
- 8) _____ Scientist done the study on linkage.
 - a) Bateson And Punnel
 - b) Sulton and Bovery
 - c) T.H. Morgon
 - d) None of these
- 9) When two or more characters are inherited together which are governed by two or more genes called as _____.
 - a) Complete gene
 - b) Incomplete gene
 - c) Interaction of gene
 - d) None of these

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Special Paper - X)
Complex Analysis (19201525)

Day & Date: Wednesday, 10-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Select the correct alternatives for each of the following. 10

- 1) What is the real part of function Ze^z is _____.
 a) $e^x(x \cos y - y \sin y)$ b) $e^x(x \cos y + y \sin y)$
 c) $e^x(x \sin y + y \cos y)$ d) $e^x(x \sin y - y \cos y)$
- 2) The families are orthogonal the product of slope is _____.
 a) 1 b) -1
 c) 0 d) 2
- 3) The function $f(z) = e^z$ has _____ at $z = \infty$.
 a) Isolated essential singularity
 b) Pole
 c) Removable singularity
 d) No singularity
- 4) A pole of order _____ is said to be simple pole.
 a) 2 b) greater than one
 c) less than one d) 1
- 5) A region in which every closed curve can be shrunk to a point without passing out of the region is called _____ region.
 a) simply connected
 b) multiply connected
 c) neither simply or multiply connected
 d) simply not connected
- 6) Residue of poles of order m greater than _____.
 a) zero b) unity
 c) constant d) infinity
- 7) The curve $z(t) = t^2, -1 \leq t \leq 1$ is closed but _____.
 a) simple b) not simple
 c) Jordon arc d) Both a and b
- 8) If $u = x^3 - 3xy^2$ is harmonic function then their corresponding analytic function $f(z) =$ _____.
 a) $z + c$ b) $z^2 + c$
 c) $z^3 + c$ d) $-z^4 + c$

- 9) The Laplace equation is _____.
- a) $\frac{\partial^2 \phi}{\partial x^2} = \frac{\partial^2 \phi}{\partial y^2}$ b) $\frac{\partial^2 \phi}{\partial x^2} = -\frac{\partial^2 \phi}{\partial y^2}$
- c) $\frac{\partial \phi}{\partial x} = -\frac{\partial \phi}{\partial y}$ d) $\frac{\partial \phi}{\partial x} = \frac{\partial \phi}{\partial y}$
- 10) The singularity of $f(z) = \frac{z+3}{(z-1)(z-2)}$ are _____.
- a) $z = 1, 3$ b) $z = 1, 0$
- c) $z = 1, 2$ d) $z = 2, 3$

B) Fill in the blanks.

06

- 1) If $f(z) = F(g(z))$ then $\frac{d}{dz} f(z) = \underline{\hspace{2cm}}$.
- 2) A conjugate harmonic function of $u(x, y) = e^x \sin y$ is _____.
- 3) The evaluate integral of the type $\int_0^{2\pi} f(\cos \theta, \sin \theta) d\theta$ is _____.
- 4) The residue of $f(z) = \frac{z^2}{(z-1)^2(z-2)}$ at $z = 1$ is _____.
- 5) Norm is the _____ number of the numbers of the $t_1 - t_0, t_2 - t_1, \dots, t_n - t_{n-1}$
- 6) A contour is continuous chain of finite number of _____.

Q.2 Solve any eight of the following.

16

- a) Expand the function $f(z) = \sin z$ in a Taylors series about $z = 0$.
- b) Expand $f(z) = \frac{1}{(z+1)(z+3)}$ is a Laurent's series valid for the region $|z| < 1$
- c) If $w = f(z)$ is analytic in the region R then show that $\frac{dw}{dz} = \frac{\partial w}{\partial x} - i \frac{\partial w}{\partial y}$
- d) Find the Residue of $f(z) = \frac{1}{(z^2+1)^3}$ at $z = i$
- e) Evaluate the residues of $\frac{z^3}{(z-1)(z-2)(z-3)}$ at $z = 1, 2, 3$
- f) Define isolated singularity.
- g) If $f(z)$ and $g(z)$ are analytic function in domain D then show that
$$\frac{d}{dz} \left[\frac{f(z)}{g(z)} \right] = \frac{g(z) \cdot \frac{d}{dz} [f(z)] - f(z) \cdot \frac{d}{dz} [g(z)]}{[g(z)]^2}$$
- h) Show that the function $u = x^3 - 3xy^2 - 3x^2 - 3y^2 + 1$ is harmonic function.
- i) Evaluate $\int_L \frac{dz}{z-a}$ where L represents a circle $|z-a| = r$
- j) Construct the analytic function $f(z) = u + iv$ where $u = y^3 - 3x^2y$.

Q.3 A) Attempt any Two of the following.

10

- 1) Show that $\sin \left\{ c \left(z + \frac{1}{z} \right) \right\}$ can be expanded in a series of the type
$$\sum_{n=0}^{\infty} a_n z^n + \sum_{n=0}^{\infty} b_n z^{-n}$$
 in which coefficients of both z^n and z^{-n} are
$$\frac{1}{2\pi} \int_0^{2\pi} \sin(2c \cos \theta) \cos n\theta d\theta$$
- 2) If $\lim_{z \rightarrow a} (z-a)f(z) = A$ and c is the arc $\theta_1 \leq \theta \leq \theta_2$ of the circle $|z-a| = r$, then show that $\lim_{r \rightarrow 0} \int_c f(z) dz = iA(\theta_2 - \theta_1)$
- 3) Expand $\frac{1}{z(z^2-3z+2)}$ for the regions
 - a) $0 < |z| < 1$ b) $1 < |z| < 2$

B) Prove that the polar of Cauchy's Riemanns equations **06**

$$\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta} \text{ and } \frac{\partial v}{\partial r} = -\frac{1}{r} \frac{\partial u}{\partial \theta} \text{ where } r = \sqrt{x^2 + y^2}, \theta = \tan^{-1} \left(\frac{y}{x} \right)$$

Q.4 A) Attempt any two of the following. **08**

1) State and prove Cauchy fundamental theorem.

2) Show that $\int_0^{2\pi} \frac{d\theta}{a+b \cos \theta} = \frac{2\pi}{\sqrt{a^2-b^2}}, a > b > 0$

3) If $u - v = (x - y)(x^2 + 4xy + y^2)$ and $f(z) = u + iv$ is an analytic function of $z = x + iy$ find $f(z)$ in terms of z .

B) Explain the Milne-Thomson's method for constructing the regular function. **08**

Q.5 Attempt any two of the following. **16**

a) State and prove Cauchy Residue Theorem.

b) Integrate z^2 along the straight-line OM and also along the path OLM consisting of two straight line segments OL and OM where O is origin, L is the point $z = 3$ and M the point $z = 3 + i$.

Hence show that the integral of z^2 along the closed path OLMO is zero.

c) If a function $f(z) = u(x, y) + iv(x, y)$ is analytic and its partial derivatives u_x, u_y, v_x, v_y are satisfy then prove that $u_x = v_y$ and $u_y = -v_x$

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper - X)
Probability Distributions (19201529)

Day & Date: Wednesday, 10-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose the correct alternative of the following. 10

- 1) For a standard Laplace distribution, we observe _____.
 a) mode < median b) mean > median
 c) mean = median ≠ mode d) mean = median = mode
- 2) For Cauchy distribution _____ exists.
 a) mean b) median
 c) variance d) none of these
- 3) The variance of standard Laplace distribution is _____.
 a) 2 b) 1
 c) 4 d) does not exist
- 4) If a random variable X truncated to the right above b then $p(x \geq b)$ is _____.
 a) 1 b) 0.5
 c) 0 d) None of these
- 5) Let (X, Y) is $BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, P)$ and are independent then $P =$ _____.
 a) 0 b) 0.25
 c) 0.75 d) 1
- 6) If X is LN (0,1) Then mean is _____.
 a) 0 b) 1
 c) $\frac{1}{e^2}$ d) e^2
- 7) If X is Cauchy (μ, λ) then its quartile deviation is _____.
 a) λ b) $\mu + \lambda$
 c) μ d) $\mu - \lambda$
- 8) Mean of truncated Binomial distribution truncated at $x = 0$ is _____.
 a) $\frac{np}{q}$ b) $\frac{np}{1 - q^n}$
 c) np d) $\frac{np}{q^n}$
- 9) Let (X, Y) is $BN(3,2,4,9,0.5)$ then $cov(X, Y)$ is equal to _____.
 a) 3 b) 2
 c) 1 d) 0

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Special Paper – X)
Hydrogeology (19201535)**

Day & Date: Wednesday, 10-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat labeled diagram wherever necessary.

Q.1 A) Rewrite the sentence by filling the blanks with the correct answer from the given options. 10

- 1) What quality does Basalt have as an aquifer wrt to its primary porosity?
 - a) very good
 - b) good
 - c) bad
 - d) excellent
- 2) Ideally, how is the infiltration rate in crystalline rock terrain as compared to sedimentary rock terrain?
 - a) Larger
 - b) Greater
 - c) Poor
 - d) Very poor
- 3) What rate of infiltration does igneous rocks have in comparison to their tectonically disturbed equivalents?
 - a) Better
 - b) Poor
 - c) Very poor
 - d) Very good
- 4) What is the climatic condition that does not promote infiltration, though the terrain is a plain ground & rocks are sedimentary?
 - a) Hot
 - b) Tropical
 - c) Cold
 - d) equatorial
- 5) What is the runoff rate in sandstone rock terrains?
 - a) Lesser
 - b) Greater
 - c) Poor
 - d) Very poor
- 6) What is the topmost zone in vertical distribution of groundwater?
 - a) Capillary
 - b) Root
 - c) Saturation
 - d) Aeration
- 7) What porosity features do the shear zones rocks show?
 - a) Effective
 - b) Secondary
 - c) Primary
 - d) Bad
- 8) What type of aquifer is the Basaltic terrain?
 - a) Confined
 - b) Idealized
 - c) Bad
 - d) unconfined
- 9) What geological characteristics do the localities in India like Unhere & Tatapani are famous for?
 - a) Contact springs
 - b) Hot springs
 - c) Depression springs
 - d) Seepage areas

10) Which is the undeveloped source field for non-conventional energy in India?

- a) Nuclear
- b) Hydro-thermal
- c) Geo-thermal
- d) Hydro-electric

B) Answer the following. 06

- 1) What is the process of plants expelling water through their leaves?
- 2) What is pore percent per unit volume of a formation called as?
- 3) What is a piezometric surface?
- 4) Rainwater flowing on the surface of terrain after infiltration is called as _____.
- 5) Groundwater flowing out through pores or fractures of rocks is called as _____.
- 6) Non flowing groundwater just oozing out through pores or fractures of rocks & moistening its surface is called as _____.

Q.2 Write answers to any eight of the following. 16

- a) What are indicators for a basin?
- b) What is connate water? Give an example.
- c) What is juvenile water? Give an example.
- d) What is Aquifer? Which common rock is a good aquifer?
- e) What is Transmissivity? Which rock is poor in it?
- f) What is the purpose of artificial levees?
- g) What is a water table? Is it fixed in position?
- h) Write a short description of aquifuge? Give an example.
- i) What is aquitard? Give an example.
- j) What is a hot spring? Give an example.

Q.3 A) Attempt any Two of the following. 10

- 1) Describe the permeability of sedimentary rocks & its deciding factors?
- 2) Explain the sources of Groundwater.
- 3) Describe types of groundwater basin. Draw appropriate diagram.

B) Draw and describe the hydrological cycle. 06

Q.4 A) Attempt any two of the following. 08

- 1) Describe the factors controlling the depression spring.
- 2) Describe the factors controlling the contact spring.
- 3) Describe the factors controlling the surface runoff of rainwater.

B) Mention the relation to runoff with flood & groundwater recharge. Add note on the role of vegetation in groundwater recharge processes. 08

Q.5 Attempt any Two of the following. 16

- a) What are the different types of structural features that can be identified on the aerial photographs and the satellite imageries? Explain how to use them for the groundwater explorations.
- b) Sketch the diagram & explain the vertical distribution of groundwater in an ideal, unconfined aquifer.
- c) Explain the groundwater conditions for the formation of hot springs. Add note on its significance. Draw sketch of geyser.

- B) Answer the following. 06**
- 1) Name the enzyme responsible for NO_3 reduction.
 - 2) _____ is the causative agent of soft rot of potato.
 - 3) Growing quickly growing leguminous or non leguminous plant and ploughing it is called _____.
 - 4) Give an example of symbiotic association.
 - 5) Name the product produced by N_2 fixation.
 - 6) A manure prepared using cow dung, litter and urine is called _____.

- Q.2 Solve any Eight of the following. 16**
- a) Define Phosphate solubilization.
 - b) Give structure of cellulose.
 - c) Define canker.
 - d) Define Nitrate reduction.
 - e) Define GM crops.
 - f) Define commensalism.
 - g) Name two nitrogen fixing bacteria.
 - h) Define biofertilizer with example.
 - i) Define vermicompost.
 - j) Define soil structure.

- Q.3 A) Attempt any Two of the following. 10**
- 1) Give an account of biochemistry of cellulose degradation.
 - 2) Discuss about production and application of Rhizobium biofertilizer.
 - 3) Give an account of 'Carbon cycle'
- B) Explain production and significance of Vermicompost. 06**

- Q.4 A) Attempt any Two of the following. 08**
- 1) Discuss about causative agent symptoms and control of 'Soft rot of potato'.
 - 2) Discuss sulphur cycle.
 - 3) Farm Yard Manure.
- B) Give an account of beneficial and harmful interactions in soil. 08**

- Q.5 Attempt any Two of the following. 16**
- a) Describe in detail 'Lignin degradation'.
 - b) Give an account of biopesticides, their production and application.
 - c) Give an account of Nitrogen cycle.

Seat No.	
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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Special Paper – X)
Fundamentals of Microcontroller (19201549)

Day & Date: Wednesday, 10-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions.

10

- 1) Microcontroller uses _____ memory architecture.
 - a) Von Neumann
 - b) Harvard
 - c) RISC
 - d) CISC
- 2) The first address of Bank-2 registers is _____.
 - a) 08 H
 - b) 0F H
 - c) 10 H
 - d) 1F H
- 3) Which one of these pins of μC 8051 is used to access external ROM?
 - a) \overline{EA}
 - b) ALE
 - c) \overline{PSEN}
 - d) RESET
- 4) To configure the parallel port as an input port, _____ is sent to the port.
 - a) 00 H
 - b) 55 H
 - c) AA H
 - d) FF H
- 5) What is the address range of SFR registers?
 - a) 00 – 2F H
 - b) 30 – 7F H
 - c) 00 – 7F H
 - d) 80 – FF H
- 6) How many bit addressable RAM bits are present in μC 8051?
 - a) 128
 - b) 64
 - c) 32
 - d) 8
- 7) If the data value 38H is ANDed with 59H, the result is _____.
 - a) 18H
 - b) 79H
 - c) 61
 - d) C7H
- 8) Which one of these figures is a standard baud rate?
 - a) 512
 - b) 1024
 - c) 2048
 - d) 4800
- 9) What is the maximum delay generated by the timer having 12 MHz crystal frequency and operating in Mode-1?
 - a) 128 μS
 - b) 256 μS
 - c) 512 μS
 - d) 65536 μS
- 10) Which one of these instructions should be used for copying the accumulator data to the external memory?
 - a) MOVX A, @DPTR
 - b) MOVX @DPTR,A
 - c) MOVC A, @A+DPTR
 - d) MOVC A, @PC

- B) Answer in short / Fill in the blanks. 06**
- 1) Write a short jump instruction used in microcontroller 8051.
 - 2) Which control bits are used to start or stop the timer/counter are?
 - 3) MOVX A, @DPTR is how many byte instruction?
 - 4) If Accumulator A=49 H, the result after executing the instruction RL A will be _____.
 - 5) To configure port pin P1.5 as an input pin, the instruction used will be _____.
 - 6) Draw the flowchart symbol used for decision making.

- Q.2 Solve any eight of the following. 16**
- a) Power on RESET in μ C8051.
 - b) Give the significance of ALE pin.
 - c) State the function of RI and TI flags in μ C 8051.
 - d) Write any two logical instructions and explain.
 - e) Explain with suitable example the SWAP instruction.
 - f) Explain the relationship between Timer Clock frequency and Crystal frequency.
 - g) Justify, why the crystal oscillator frequency in μ C 8051 is chosen to be 11.0592 MHz.
 - h) Draw the data format of TCON register and explain.
 - i) List the interrupt sources in μ C 8051.
 - j) Give the difference between bit-addressable and byte-addressable SFR.

- Q.3 A) Attempt any two of the following. 10**
- 1) Draw the Clock and RESET circuit diagram for μ C 8051 and explain.
 - 2) List the SFRs available in μ C 8051 with their function.
 - 3) Write an assembly language program to multiply two 8-bit numbers and save the result.
- B) Write an ALP to transfer ten bytes of data from internal memory to external memory. 06**

- Q.4 A) Attempt any two of following. 08**
- 1) Explain the important features of μ C 8051.
 - 2) Draw the structure of PORT-1.
 - 3) Explain the data addressing modes of μ C 8051 with one example for each.
- B) Draw the flowchart and write an assembly language program to divide two 8-bit numbers. Save the quotient and remainder. 08**

- Q.5 Attempt any two of the following. 16**
- a) Discuss the classification of instruction set of μ C 8051 with suitable example for each.
 - b) Write an assembly language program to generate 5KHz square-wave using timer on port pin P1.5. Assume a crystal frequency of 12 MHz.
 - c) Explain Mode-1 of serial communication and write an ALP to transfer serially 8-bit data received from PORT-1 at a standard baud rate of 9600.

- B) Fill in the Blanks. 06**
- 1) _____ keyword is used for declaring a package in java.
 - 2) In java _____ contain only public abstract methods.
 - 3) _____ Statement is used to throw custom exception.
 - 4) _____ keyword is used to call base class constructor in derived class constructor.
 - 5) In swing A _____ control is a dialogue window that allows the user to pick a file?
 - 6) The _____ block is executed whether an exception is handled or not.

- Q.2 Answer the followings. (Any Eight) 16**
- a) Write a note on ArrayList and HashMap.
 - b) What is Runnable interface?
 - c) What is file reader and file writer?
 - d) Write a note on single inheritance.
 - e) What is use of extends keyword in java?
 - f) What is abstract method?
 - g) Write a note on while loop.
 - h) Write a note on JRE.
 - i) Write different data types in Java.
 - j) Write application of Java programming language.

- Q.3 A) Answer the followings. (Any Two) 10**
- 1) Write a program to extend one interface in another interface.
 - 2) What is use of 'this' keyword? Explain with example.
 - 3) Explain if else statement with example.

B) Write a note on collection classes. 06

- Q.4 A) Answer the followings. (Any Two) 08**
- 1) Write a program to copy content of one file into another file.
 - 2) Explain method overriding with example.
 - 3) Write a difference between AWT and swing.

B) What is use of thread class? Explain methods of thread class. 08

- Q.5 Answer the following. (Any Two) 16**
- a) What is thread synchronization? Explain with example.
 - b) What is user defined exception? Write a program for implement it.
 - c) Explain JDK in detail.

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
PHYSICS (Special Paper - XI)
Classical Mechanics (19201513)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Use of log table and calculator is allowed.

Q.1 A) Multiple choice questions.**10**

- 1) Any rigid body having large number of particles has _____ degrees of freedom.
 - a) 2
 - b) 3
 - c) 5
 - d) 6
- 2) In conservative force field _____ remains constant.
 - a) Linear momentum
 - b) Angular momentum
 - c) Energy
 - d) Both (a) and (b)
- 3) In northern hemisphere, due to Coriolis's force, cyclone deflects towards _____.
 - a) North
 - b) South
 - c) East
 - d) West
- 4) In absence of resistance; the range of projectile is _____.
 - a) $2uv/g$
 - b) uv/g
 - c) $uv/2g$
 - d) $2v/g$
- 5) Acceleration of Atwood's machine is _____.
 - a) $\ddot{x} = \frac{(M1 - M2)g}{(M1 + M2)}$
 - b) $\ddot{x} = -\frac{(M1 - M2)g}{(M1 + M2)}$
 - c) $\ddot{x} = \frac{(M1 + M2)g}{(M1 - M2)}$
 - d) $\ddot{x} = \frac{(M1 - M2)}{(M1 + M2)}$
- 6) In the symmetric mode of oscillations, the particles are always _____.
 - a) In phase
 - b) out of phase
 - c) with constant phase
 - d) in opposite phase
- 7) Hamilton's principle is _____ principle.
 - a) differential
 - b) calculus
 - c) integral
 - d) extreme
- 8) In rigid body motion, the quantities I_{xy} , I_{yz} , I_{zx} are called _____.
 - a) Moment of inertia
 - b) Product of inertia
 - c) measured inertia
 - d) tensor
- 9) The principle of virtual work is _____.
 - a) $\sum F_i^a \cdot \delta r_i = 0$
 - b) $\sum f_i \cdot \delta r_i = 0$
 - c) $\sum F_i \cdot \delta r_i = 0$
 - d) $\sum F_i^a \cdot \delta r_i + \sum f_i \cdot \delta r_i = 0$

10) The energy transfer from an oscillator to its coupled partner is periodic and takes place with the period _____.

- a) $T = \frac{2\pi}{\omega_1 - \omega_2}$ b) $T = \frac{3\pi}{\omega_1 - \omega_2}$
 c) $T = \frac{5\pi}{\omega_1 - \omega_2}$ d) $T = \frac{4\pi}{\omega_1 - \omega_2}$

B) Define the following. 06

- 1) Linear momentum
- 2) Centripetal force
- 3) Pseudo force
- 4) Coriolis force
- 5) Rigid body
- 6) Centre of mass

Q.2 Solve any EIGHT of the following. 16

- a) What are coupled oscillations?
- b) Define symmetric and antisymmetric mode of oscillations.
- c) Define degree of freedom.
- d) State Hamilton's principle.
- e) Define time of flight of projectile.
- f) What are constraints?
- g) State Euler's theorem.
- h) State conservation theorem for angular momentum of a particle.
- i) Application of Lagrangian equation for Simple harmonic oscillator.

Q.3 A) Attempt any TWO of the following. 10

- 1) Show that the shortest distance between two points in space is a straight line.
- 2) State and prove Brachistochrome problem.
- 3) Explain the effect of Coriolis's force on formation of cyclones and flight of missile.

B) Write short note on, "Minimum surface of revolution". 06

Q.4 A) Attempt any TWO of the following. 08

- 1) Explain the energy transfer mechanism in coupled oscillatory system.
- 2) State and prove the conservation theorem for energy of a system of particles.
- 3) Obtain angular momentum of a rigid body.

B) Describe normal modes and normal coordinates. 08

Q.5 Attempt any TWO of the following. 16

- a) Derive an expression for time of flight and range of projectile in resistive medium.
- b) Derive the Euler-Lagrange's equation of motion using Hamilton's principle.
- c) Show that the angular acceleration is the same in fixed and rotating coordinate system.

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper - XI)
Organic Chemistry (19201508)

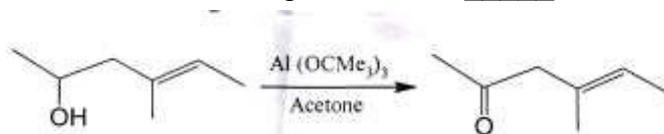
Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to right indicate full marks.
 3) Draw neat diagram and give equations wherever necessary.
 4) Chart of spectroscopic data supplied by university is allowed.

Q.1 A) Choose the most correct alternative.**10**

- Which of the following reagent is used in Wittig reaction?
 a) Al-ter-butoxide b) Zinc/ether
 c) Al-isopropoxide d) Phosporous ylide
- The m/e of methanol is observed at _____.
 a) 16 b) 32
 c) 48 d) 12
- In chair conformation of cyclohexane, all the axial C-H bonds are in _____ position.
 a) staggered b) elipsed
 c) skew d) all of these
- The MPV reduction occurs through the shift of _____ ion.
 a) OH⁻ b) hydride ion
 c) Proton d) Al⁺³
- Among the following _____ is a magnetic nucleus.
 a) ${}^1_1\text{H}^1$ b) ${}^{12}_6\text{C}^{12}$
 c) ${}^4_2\text{He}^4$ d) ${}^{16}_8\text{O}^{16}$
- Name of the following reaction is _____.



- Oppenaur oxidation b) M.P.V. reduction
 - Stobbe condensation d) Hoffmann rearrangement
- The C-H stretching frequency at 2700 cm^{-1} is due _____ group.
 a) alcohol b) ketone
 c) ester d) cyano
 - Diethyl malonate on condensation with urea in presence of POCl_3 gives _____.
 a) 4-methyl uracil b) antipyrine
 c) barbituric acid d) crotonic acid

- 9) Cis 2-butene on addition with bromine gives _____.
 a) racemic mixture b) l-isomer
 c) d-isomer d) none of these
- 10) In boat conformation of cyclohexane, the distance between two flagpole hydrogen atoms is _____.
 a) 0.83 \AA b) 1.83 \AA
 c) 1.20 \AA d) 1.54 \AA

B) Fill in the blanks.

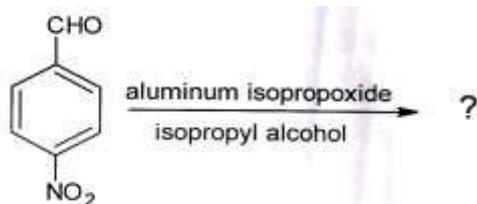
06

- In _____ spectroscopy, gaseous organic molecule is bombarded with electron at elevated temperature and reduced pressure.
- In cyclohexane, _____ conformation is most stable.
- Number of set of equivalent protons in propionaldehyde is/are _____.
- In Hofmann Rearrangement, benzamide is converted into _____.
- In case of CO_2 molecule, number of fundamental modes of vibrations is/are _____.
- According to Baeyer strain theory, _____ is more stable among cycloalkane.

Q.2 Solve the following. (Any Eight)

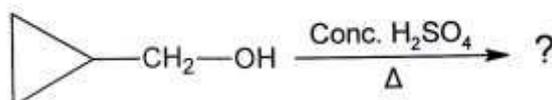
16

- Give the synthesis of crotonic acid from aceto acetic ester.
- Define the terms:
 - Coupling constant
 - Magnetic nuclei
- What are the types of ions produced in mass spectroscopy?
- Explain the principle of mass spectroscopy.
- Give the synthesis of succinic acid from aceto acetic ester.
- Explain acidic nature of methylene group in diethyl malonate.
- What is Wittig reagent? How it is prepared?
- State and explain Hooke's law.
- Define the terms:
 - Stereoselective reaction
 - Stereospecific reaction
- Predict the product and name to following reaction.

**Q.3 A) Attempt any Two of the following.**

10

- What is basic principle of IR spectroscopy? Draw schematic diagram of double beam IR spectrophotometer.
- What is active methylene compound? Explain with mechanism preparation of ethylaceto acetate by Claisen Condensation.
- Complete the following reaction, name it and suggest mechanism.



- B)** An organic compound A[C₈H₈O] shows IR absorption at 1700 cm⁻¹. It gives sooty flame but do not reduce Tollen's reagent. This compound A on condensation with dialkyl succinate B[C₈H₁₄O₄] in presence of potassium tert butoxide gives compound C[C₉H₁₃O₄K]. What are A, B and C? Write reaction and name it. **06**

Q.4 A) Answer the following. (Any Two) **08**

- 1) Discuss applications of mass spectroscopy.
- 2) Determine the structure from following data.
Molecular formula - C₄H₈O, IR - 1720 cm⁻¹,
NMR: δ 1.0 (triplet, 3H), δ 1.2 (sextet, 2H), δ 2.2 (quartet, 2H), δ 9.8 (triplet, 1H).
- 3) How will you synthesize:
 - a) cinnamic acid
 - b) 2-methyl propanoic acid by using diethyl malonate?

B) Discuss the terms: **08**

- 1) Spin-spin splitting
- 2) Coupling constant

Q.5 Attempt any Two of the following. **16**

- a) Explain Reformatsky reaction with mechanism and synthetic applications.
- b) Discuss conformations and stability of cyclohexane in detail.
- c) Explain PMR spectra of:
 - 1) Acetaldehyde
 - 2) Ethanol

TABLE - 1
Characteristic Infrared Absorptions of Functional Groups

GROUP	FREQUENCY RANGE cm^{-1}	INTENSITY
A. Alkyl		
C - H (stretching)	2853 - 2962	(m - s)
Isopropyl - $\text{CH}(\text{CH}_3)_2$	1380 - 1385	(s)
	and 1365 - 1370	(s)
tert - Butyl - $\text{C}(\text{CH}_3)_3$	1385 - 1395	(m)
	and - 1365	(s)
B. Alkenyl		
C-H (stretching)	3010 - 3095	(m)
C = C (stretching)	1620 - 1680	(v)
R - CH = CH ₂	985 - 1000	(s)
	and 905 - 920	(s)
R ₂ C = CH ₂ (out of plane C-H bendings)	880 - 900	(s)
cis - RCH = CHR	675 - 730	(s)
trans - RCH = CHR	960 - 975	(s)
C. Alkynyl		
\equiv C - H (stretching)	- 3300	(s)
C \equiv C (stretching)	2100 - 2260	(v)
D. Aromatic		
Ar - H (stretching)	- 3030	(v)
Aromatic substitution type (C-H out-of-plane bendings)		
Monosubstituted	690 - 710	(very s)
	and 730 - 770	(very s)
o - Disubstituted	735 - 770	(s)
m - Disubstituted	680 - 725	(s)
	and 750 - 810	(very s)
p - Disubstituted	800 - 840	(very s)
E. Alcohols, Phenols, Carboxylic Acids		
OH (alcohols, phenols, dilute solutions)	3590 - 3650	(sharp v)
OH (alcohols, phenols, hydrogen bonded)	3200 - 3550	(broad s)
OH (carboxylic acids, hydrogen bonded)	2500 - 3000	(broad v)
F. Aldehydes, Ketones, Esters and Carboxylic Acids		
C = O stretch 1720	1630 - 1780	(s)
aldehydes - 1720 (Stre 2700 - 2900)	1690 - 1740	(s)
ketones	1680 - 1750	(s)
esters	1735 - 1750	(s)
carboxylic acids	1710 - 1780	(s)
amides	1630 - 1690	(s)
G. Amines		
N - H	3300 - 3500	(m)
H. Nitriles		
C \equiv N	2220 - 2260	(m)

TABLE - 2
Approximate Proton Chemical Shifts in NMR

TYPE OF PROTON	CHEMICAL SHIFT, DELTA, PPM (δ)	
1° Alkyl, RCH ₃	0.8 - 1.0	
2° Alkyl, RCH ₂ R	1.2 - 1.4	
3° Alkyl R ₃ CH	1.4 - 1.7	
Allylic, R ₂ C = C - CH ₂ R	1.6 - 1.9	Ester R - C(=O) - O - CH ₂ - R 4 to 4.5 N - CH ₃ 2.3
Benzylic, ArCH ₂	2.2 - 2.5	
Alkyl chloride, RCH ₂ Cl	3.6 - 3.8	
Alkyl bromide, RCH ₂ Br	3.4 - 3.6	
Alkyl iodide, RCH ₂ I	3.1 - 3.3	
Ether, ROCH ₂ R	3.3 - 3.9	
Alcohol, HOCH ₂ R	3.3 - 4.0	
Ketone, RC(=O)CH ₃	2.1 - 2.6	
Aldehyde, RCH(=O)	9.5 - 9.6	
Vinylic, R ₂ C = CH ₂	4.6 - 5.0	
Vinylic R ₂ C = CH R	5.2 - 5.7	
Aromatic, ArH	6.0 - 9.5	
Acetylenic, RC \equiv CH	2.5 - 3.1	
Alcohol hydroxyl, ROH	0.5 - 6.0 ^a	
Carboxylic, RCOH O	10 - 13 ^a	
Phenolic, ArOH	4.5 - 7.7 ^a	
Amino R - NH ₂	1.0 - 5.0	

^aThe chemical shifts of these groups vary in different solvents and with temperature and concentration.

TABLE - 3
U.V. Absorption rules for Diene Chromophores

1) Parent	215 nm	
2) Each extra conjugation	30 nm	
3) Homoannular	39 nm	
4) Exocyclic double bond	05 nm	- OH, - OR, Cl, Br 5 (nm)
5) Each alkyl (R) substituent directly attached to double bonded carbon	05 nm	- SR, (30 nm), - NR ₂ (60 nm)

U.V. Absorption rules for Enone System

1) Parent	215 nm			
2) Each extra conjugation	30 nm			
3) Homoannular	39 nm			
4) Substituents				
a) Alkyl group at α	10 nm			
b) Alkyl group at β	12 nm			
c) Alkyl group at γ, δ	18 nm			

	α	β	γ
Cl	15	12	
OH, OR	35	30	
SR		85	
NR ₂		95	
O		75	
Acyl	6	6	6

- B) Fill in the blanks. 06**
- 1) The nitrogen bases of one polynucleotide chain is joined to complementary chain by _____.
 - 2) Gene transformation experiments were demonstrated by _____.
 - 3) Okazaki fragments in DNA replication are joined by _____.
 - 4) The double helical model of DNA was proposed by _____.
 - 5) The termination codon is _____.
 - 6) The endonuclease enzyme work at _____.

- Q.2 Solve any Eight of the following. 16**
- a) What is nucleoside?
 - b) What is TATA box?
 - c) Define genetic code.
 - d) What is transformation?
 - e) What is transcription?
 - f) What is termination?
 - g) What is consensus sequence?
 - h) What is satellite DNA?
 - i) What are nonsense codons?
 - j) What is promoter?

- Q.3 A) Attempt any Two of the following. 10**
- 1) Explain the organization of gene in prokaryotes.
 - 2) Write note on RNA splicing.
 - 3) Explain any two posttranslational modification.
- B) Explain the process of DNA denaturation with its importance in DNA analysis. 06**

- Q.4 A) Attempt any Two of the following. 08**
- 1) Describe the structure of B - DNA molecule.
 - 2) Describe the structure of tRNA with suitable diagram.
 - 3) Explain the Griffith experiment with suitable diagram.
- B) Explain the mechanism of DNA replication in prokaryotes. 08**

- Q.5 Attempt any Two of the following. 16**
- a) Explain the Lac operon with suitable diagram.
 - b) Give the difference between Prokaryotic and eukaryotic replication.
 - c) Explain the process of translation.

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Special Paper - XI)
Endocrinology (19201522)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagrams wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions.**10**

- 1) Melatonin is secreted by _____.
 - a) skin
 - b) pituitary gland
 - c) pineal body
 - d) Thyroid
- 2) Chemically hormones are _____.
 - a) proteins only
 - b) steroids only
 - c) proteins, steroids and biogenic amines
 - d) biogenic amines only
- 3) Which of the following is secreted by the posterior lobe of the pituitary gland and stimulates contraction of the uterus during labor?
 - a) Estrogen
 - b) Oxytocin
 - c) Progesterone
 - d) Prolactin
- 4) Graffian follicles are the part of _____.
 - a) Testis
 - b) Adrenal gland
 - c) Pituitary gland
 - d) Ovary
- 5) Insulin is secreted by ____ gland.
 - a) Adrenal
 - b) Thymus
 - c) Pancreas
 - d) Posterior lobe of pituitary
- 6) HPA axis related with for _____.
 - a) The hypothalamic-pituitary-adrenal axis
 - b) The Hepatic Portal system
 - c) The Hypothalamo -Hypophysial Axis
 - d) The Hypophysial -Pituitary Axis
- 7) Addison's disease caused by _____.
 - a) Deficiency Adrenocortical
 - b) Deficiency of Insulin
 - c) Deficiency of testosterone
 - d) Deficiency of Estrogen
- 8) The gland which is responsible for the body's circadian rhythm is the:
 - a) Thymus gland
 - b) Pineal gland
 - c) Parathyroid gland
 - d) Pituitary gland
- 9) Hypo-secretion of GH leads to _____.
 - a) Gigantism
 - b) Dwarfism
 - c) Goitar
 - d) Diabetes

- 10) These cells of the testes secrete testosterone _____.
 a) Cells of Leydig or interstitial cells
 b) Sertoli cells
 c) cells of germinal epithelium
 d) secondary spermatocytes

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06

- 1) Define endocrine gland.
 2) Structure of placenta
 3) HPA stands for _____.
 4) Define Adenohypophysis.
 5) Hydrocele is the disorder of _____.
 6) Sleep disorders is caused by the deficiency of _____.

Q.2 Solve any Eight of the following. 16

- a) Leydigs cells
 b) Neurohormone
 c) Hormonal regulation of ovary
 d) FSH
 e) Pars nervosa
 f) Progesterone
 g) GH
 h) Gigantism
 i) Acromegaly
 j) Rhinitis

Q.3 A) Attempt any Two of the following. 10

- 1) Describe the structure of ovary with the hormonal secretion and their functions.
 2) Describe feedback mechanism of hormonal regulation.
 3) Describe the structure of pineal gland and its role in biological rhythm.

B) Short note/Solve. 06

Describe hormones secreted by anterior lobe of pituitary gland.

Q.4 A) Attempt any Two of the following. 08

- 1) Describe the structure and hormones of placenta.
 2) Describe the structure and hormones secreted by testis.
 3) History of endocrinology.

B) Describe hypothalmo-hypophysial portal system. 08

Q.5 Attempt any Two of the following. 16

- a) Describe the structure, functions and disorders of pituitary gland.
 b) Explain the +ve feedback and -ve feedback mechanism of hormonal regulation with any suitable example.
 c) Describe classification of hormones on the basis of chemical nature. Add a note on mechanism of hormonal action.

Seat No.	
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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Special Paper - XI)
Real Analysis (19201526)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Select the correct alternative from the following. 10

- 1) If A and B are two sets such that $A - B = B - A$ then which one of the following is correct?
 - a) $A = \phi$
 - b) $A \cap B = \phi$
 - c) $A = B$
 - d) $B = \phi$
- 2) Which one of the following is empty set?
 - a) $\{x/x \text{ is real number and } x^2 - 1 = 0\}$
 - b) $\{x/x \text{ is real number and } x^2 + 1 = 0\}$
 - c) $\{x/x \text{ is real number and } x^2 - 9 = 0\}$
 - d) $\{x/x \text{ is real number and } x^2 = x + 2\}$
- 3) Every infinite set has a _____.
 - a) Countable subset
 - b) Uncountable subset
 - c) Countable and Uncountable subset
 - d) None of these
- 4) The sequence $\delta_n = \{1 + (-1)^n\}$ has _____.
 - a) Exactly one constant subsequence
 - b) Exactly two constant subsequence
 - c) Exactly three constant subsequence
 - d) Exactly four constant subsequence
- 5) Which of the following inequality is false?
 - a) $\underline{\lim} s_n + \overline{\lim} t_n \leq \overline{\lim} s_n + \overline{\lim} t_n$
 - b) $\underline{\lim} s_n + \overline{\lim} t_n \leq \underline{\lim} (s_n + t_n)$
 - c) $\underline{\lim} s_n + \overline{\lim} t_n \leq \underline{\lim} s_n + \underline{\lim} t_n$
 - d) $\underline{\lim} s_n + \underline{\lim} t_n \geq \underline{\lim} s_n + \underline{\lim} t_n$
- 6)
 - i) Every convergent sequence is bounded
 - ii) Every bounded sequence is convergent
 - a) i) is true, ii) is false
 - b) ii) is true, i) is false
 - c) Both i) and ii) true
 - d) Both i) and ii) false

- 7) Let sequence $\{a_n\}_{n=1}^{\infty}$ and $\{b_n\}_{n=1}^{\infty}$ converges to A and B respectively, then $\left\{\frac{a_n}{b_n}\right\}_{n=1}^{\infty}$ converges to $\frac{A}{B}$ if _____.
- $b_n \neq 0$ for all n and $B \neq 0$
 - $b_n \neq 0$ for some n
 - $b_n \neq 0$ for all n and $B \neq 0$
 - $b_n = 0$ for all n
- 8) The series $\sum_{n=1}^{\infty} (-1)^n$ is _____.
- Divergent
 - Convergent
 - Unbounded
 - Not oscillating
- 9) The series $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \dots$ is convergent for _____.
- All real values of x
 - $|x| < 1$ only
 - $|x| \leq 1$
 - $-1 < x \leq 1$
- 10) For positive term series the ratio test states that _____.
- The series convergent if $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| > 1$
 - The series convergent if $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| < 1$
 - The series divergent if $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| = 1$
 - The series divergent if $\lim_{n \rightarrow \infty} \left| \frac{a_{n+1}}{a_n} \right| < 1$

B) Fill in the blanks of the following

06

- If A and B are two subsets of universal set X then $A \cap (A \cup B)' = \underline{\hspace{2cm}}$.
- If X and Y are any two non-empty sets then $(X - Y)' = \underline{\hspace{2cm}}$.
- The set of all distinct element of sequence is called _____.
- If $\{s_n\}_{n=1}^{\infty}$ is decreasing and bounded then $\{s_n\}_{n=1}^{\infty}$ is _____.
- A series $\sum_{n=1}^{\infty} a_n$ converges then the sequence $\{a_n\}_{n=1}^{\infty}$ is _____.
- The series $\sum a_n$ is said to be conditionally converges if _____.

Q.2 Solve any Eight of the following.

16

- If $\sum a_n$ is convergent series then $\lim_{n \rightarrow \infty} a_n = 0$
- Prove that $\sum_{n=1}^{\infty} \frac{(2n^2 - 1)^n}{(2n)^{2n}}$ is convergent.
- Discuss the series $\sum_{n=1}^{\infty} \frac{n^n}{n!}$ is Cgs or divergent.
- Show that the product $N \times N$ is countable.
- To prove that $F^{-1}(X^1) = [F^{-1}(X)]^1$
- The function $F(x) = \log x$ for $x \in (0, \infty)$, if $A = [0,1]$ find $F^{-1}(A)$
- To prove that $(A \cap B) \cap C \subset A \cap (B \cap C)$
- If $s = \left\{1, \frac{1}{2}, \frac{1}{3}, \frac{1}{4}, \dots\right\}$ and $\delta(i) = 2^i$ Find $s \circ \delta$

- i) Find the limit of $\left\{\frac{(n+1)^n}{n^{n+1}}\right\}$
- j) Find limit sup (s_n) and limit inferior s_n , where $\{s_n\} = \left\{\cos\left(\frac{n\pi}{4}\right)^{(-1)^n}\right\}$

Q.3 A) Attempt any Two of the following. 10

- 1) If $f: A \rightarrow B$ and $X \subset A, Y \subset A$ then $F(X \cup Y) = f(X) \cup f(Y)$
- 2) A monotonic increasing sequence which is bounded above, then it is convergent.

3) If $\sum_{n=1}^{\infty} a_n$ converges to A and $\sum_{n=1}^{\infty} b_n$ Converges to B , then

$\sum_{n=1}^{\infty} (a_n + b_n)$ converges to $A + B$. Also if $C \in R$ then

$\sum_{n=1}^{\infty} C a_n$ Converges to CA

B) If $\lim_{n \rightarrow \infty} S_n = L$ and $\lim_{n \rightarrow \infty} t_n = M$, if $\{S_n\}_{n=1}^{\infty}$ and $\{t_n\}_{n=1}^{\infty}$ are sequence of real number, then $\lim_{n \rightarrow \infty} S_n t_n = LM$ 06

Q.4 A) Attempt any Two of the following. 08

1) If A_1, A_2, A_3, \dots are countable sets, then $\bigcup_{n=1}^{\infty} A_n$ is countable.

2) If $\sum_{n=1}^{\infty} a_n$ is dominated by $\sum_{n=1}^{\infty} b_n$ and if $\sum_{n=1}^{\infty} b_n$ converges

absolutely, the $\sum_{n=1}^{\infty} a_n$ is converges absolutely.

3) If $0 < x < 1$, then $\{x^n\}_{n=1}^{\infty}$ converges to zero.

B) If $\{a_n\}_{n=1}^{\infty}$ is a sequence of positive number such that 08

1) $a_1 \geq a_2 \geq a_3 \geq \dots \geq a_n \geq a_{n+1} \geq \dots$ and

2) $\lim_{n \rightarrow \infty} a_n = 0$, then the alternating series $\sum_{n=1}^{\infty} (-1)^{n+1} a_n$ is convergent.

Q.5 Attempt any Two of the following. 16

a) For each $n \in I$ let $I_n = [a_n, b_n]$ be a nonempty closed bounded interval of real number such that

$I_1 \supset I_2 \supset I_3 \supset \dots \supset I_n \supset I_{n+1} \supset \dots$ and

$\lim_{n \rightarrow \infty} (b_n - a_n) = \lim_{n \rightarrow \infty} (\text{length of } I_n) = 0$

Then $\bigcap_{n=1}^{\infty} I_n$ contains precisely one point

- b) If $\lim_{n \rightarrow \infty} \sup \sqrt[n]{|a_n|} = A$, then the series of real number $\sum_{n=1}^{\infty} a_n$
- i) Converges absolutely if $A < 1$
 - ii) Diverges if $A > 1$, which includes the case A becomes ∞
 - iii) If $A = 1$ the test fails
- c) If A and B are subsets of s , then prove that
- i) $(A \cup B)' = A' \cap B'$
 - ii) $(A \cap B)' = A' \cup B'$

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper - XI)
Sampling Techniques (19201530)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose the correct alternative. 10

- 1) Circular systematic sampling is used when _____.
 a) N is a multiple of n b) N is a whole number
 c) N is not divisible by n d) None of the above
- 2) The discrepancy between estimate and population parameter is known as _____.
 a) Human error b) Sampling error
 c) Non-sampling error d) None of these
- 3) Under proportional allocation the size of the sample from each stratum depends on _____.
 a) Total sample size b) Size of the stratum
 c) Population size d) All the above
- 4) The total number of possible samples of size n, drawn from population size N by SRSWOR is _____.
 a) N b) N
 c) NCn d) Nⁿ
- 5) In presence of linear trend _____ method is more efficient.
 a) Stratified b) Systematic
 c) SRSWOR d) SRSWR
- 6) Systematic sampling means _____.
 a) Selection of n contiguous units
 b) Selection of n units situated at equal distances
 c) Selection of n largest units
 d) Selection of n middle units in a sequence
- 7) Probability of selection of varies at each subsequent draw in _____.
 a) SRSWOR b) SRSWR
 c) both (a) and (b) d) nether (a) nor (b)
- 8) How many types of allocation are in common use?
 a) one b) two
 c) three d) four
- 9) In Linear systematic sampling total number of possible samples _____.
 a) N b) k
 c) n d) N!

- 10) Sampling errors can be reduced by _____.
 a) choosing a proper probability sampling
 b) selecting a sample of adequate size
 c) using a suitable formula for estimation
 d) all the above

B) Define the following. 06

- 1) Quota sampling
- 2) Non-Random sampling
- 3) Sample
- 4) Sampling frame
- 5) Population Unit
- 6) Auxiliary variable

Q.2 Solve any Eight of the following. 16

- a) State any two non-sampling errors.
- b) Give a real life situation where Systematic sampling is used.
- c) State ratio estimator.
- d) Give a real life situation where stratified random sampling is used.
- e) Define mixed sampling.
- f) What is meant by proportional allocation?
- g) Give real life situation where cluster sampling is used.
- h) State the advantages of sampling method over census method.
- i) State the sample size using Neyman-Allocation.

Q.3 A) Attempt any Two of the following. 10

- 1) Explain sampling for proportion, obtain its unbiased estimator for population proportion.
- 2) Describe, in brief the cluster sampling.
- 3) Find under what condition ratio estimate is more efficient than SRS.

B) Write a short note on a stratified random sampling. 06

Q.4 A) Attempt any Two of the following. 08

- 1) Compare regression estimator over ratio estimator.
- 2) Describe the idea of two-stage and multistage sampling in details.
- 3) Show that ratio estimator is biased.

B) Describe systematic sampling procedure. 08

Q.5 Attempt any Two of the following. 16

- a) With usual notations prove that Neyman's allocation has better precision than proportional allocation; and also prove that proportional allocation has better precision than SRS.
- b) Discuss in details about the determination of the sample size.
- c) In presence of linear of the form $Y_i = a + bi; i = 1, 2, \dots, N$, compare SRSWOR, stratified random sampling and systematic sampling.

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Special Paper - XI)
Applied Geology – Engineering Geology (19201536)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Fill in the blanks.**10**

- 1) Which of the following has definite surface of failure?
 - a) Flowage
 - b) Subsidence
 - c) Sliding
 - d) All of these
- 2) Rock types and geological structures can be studied using _____.
 - a) electrical resistivity
 - b) rock core drilling
 - c) geophysical survey
 - d) field mapping
- 3) A subsurface rock body of light density gives _____ gravity anomaly.
 - a) High/positive
 - b) low/negative
 - c) neutral
 - d) none of these
- 4) Geophones are used _____ in geophysical exploration method.
 - a) Gravity survey
 - b) Magnetic survey
 - c) Seismic survey
 - d) Electrical resistivity survey
- 5) At the construction stage what type of task is undertaken by the engineering geologist?
 - a) The geologist plots topographic, geological features and geologically weaknesses at the site
 - b) The geologists perform core logging
 - c) The geologists perform geophysical surveys
 - d) The geologists prepare regional geological and structural maps
- 6) What is the maximum compressive force expressed per unit area, which a stone can withstand without rupturing?
 - a) Shear strength
 - b) Tensile strength
 - c) Crushing strength
 - d) Bending strength
- 7) Pick the rock which is objectionable for use in moist conditions.
 - a) Granite
 - b) Marble
 - c) Gabbro
 - d) Limestone
- 8) Gradation of soil occurs in _____ soils.
 - a) residual
 - b) Transported
 - c) both (a) and (b)
 - d) neither (a) nor (b)
- 9) Type of dam where the forces acting on the dam are transmitted onto the abutment rocks is _____.
 - a) Gravity dam
 - b) Arch dam
 - c) Geotechnical dam
 - d) Embankment dam

- 10) Lithology does not effects on which parameter?
- Type of tunnel
 - Method of tunneling
 - Strength and extent of lining
 - Cost of the project

B) Answer the following questions in one sentence.

06

- At which stage of the civil engineering project, a special purpose (Thematic) geological maps are prepared?
- What is subsidence?
- What is the type of soil found in Indo-Gangetic plains?
- In which type of survey Current electrodes and potentiometer are used.
- Which type of geological structure can be rectified by grouting for tunneling?
- “Schistosity dipping towards downstream of the river”. Is this condition being favorable for dam construction?

Q.2 Solve any Eight of the following.

16

- Name the types and sub types of flowages in landslides.
- What are the characteristics of glacial soil?
- What is modulus of elasticity?
- What is invert in tunnel?
- What is the use of gallery of the dam?
- What is reservoir of the dam?
- Which soil occurs at deep sea?
- What are the two types of clay structure?
- What is geophone?
- What is the agent of mass movement?

Q.3 A) Attempt any Two of the following.

10

- Give various methods to control landslides?
- Describe masonry dam?
- Write a note on “Engineering geological work at construction stage.”

B) Write a note on selection of site for tunnel construction in folded region.

06

Q.4 A) Attempt any Two of the following.

08

- Explain sliding in mass movement.
- Describe 1:1 and 2:1 layer in clays with appropriate figures.
- Describe magnetic survey method for site investigation?

B) Explain uniaxial compressive strength.

08

Q.5 Attempt any Two of the following.

16

- Earthen and rock-fill dams.
- What types of precautionary measures one should take during the construction of tunnels in hard and soft rocks?
- Engineering classification of soil.

Seat No.	
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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Special Paper - XI)
Immunology (19201541)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.

Q.1 A) Choose correct alternative and write the sentence again. 10

- 1) MHC is present in _____.
 - a) only human
 - b) only mouse
 - c) human & mouse
 - d) all mammals
- 2) Histamine is _____.
 - a) Primary mediator of anaphylaxis
 - b) secondary mediator of anaphylaxis
 - c) atopen
 - d) allergen
- 3) IgE antibodies play role in _____.
 - a) anaphylaxis
 - b) serum sickness
 - c) Arthus reaction
 - d) contact dermatitis
- 4) MHC class II molecules are encoded by the genes _____.
 - a) HLA – A, HLA – B, HLA – C
 - b) HLA – DP, HLA – DQ, HLA – DR
 - c) C4, C2, BF
 - d) HLA – TNF α , HLA – TNF β , HLA C4
- 5) B cells carry _____ as BCR.
 - a) IgD & IgM
 - b) IgA & IgB
 - c) Only IgM
 - d) IgA & IgD
- 6) CMI protects the body from _____ pathogen.
 - a) Intracellular
 - b) Extracellular
 - c) Both intracellular & extracellular
 - d) None of these
- 7) The graft rejection involves _____ cells.
 - a) mast
 - b) basophils
 - c) cytotoxic cells
 - d) endothelial
- 8) The inability to distinguish between self-cells and non-self-cells may lead to _____.
 - a) hypersensitivity
 - b) auto-immune diseases
 - c) Immunodeficiency
 - d) tolerance
- 9) Hybridoma cells are selected by culturing them in a medium containing _____.
 - a) Adenine, guanine, cytosine and thymine
 - b) Adenine, guanine, cytosine and uracil
 - c) Hypoxanthine, aminopterin and thymine
 - d) Hypoxanthine, aminopterin and thymidine

- 10) C1 component of classical complement pathway is made up of _____.
a) Complements 1q and 1r b) Complements 1q and 1s
c) Complements 1r and 1s d) Complements 1q, 1r and 1s

B) Answer in One sentence**06**

- 1) What is atopy?
- 2) Mention the antibodies involved in serum sickness.
- 3) Mention the non organ specific autoimmune diseases
- 4) Which blood group is universal acceptor?
- 5) Define autograft.
- 6) What is complement?

Q.2 Answer in short (Any Eight)**16**

- a) Write the function of MHC class II molecules.
- b) Name any four blood transfusion reaction complications.
- c) What is Myasthenia gravis?
- d) What is the composition of MHC Class I molecules?
- e) Write any two differences between humoral and cell mediated immune response
- f) Which are the activators of Alternate complement activation pathway?
- g) What is primary immune response?
- h) What is the function of dendritic cells?
- i) What is the function of macrophages?

Q.3 A) Attempt any Two of the following.**10**

- 1) Describe the biological effects of complement activation.
- 2) Write a note on Arthus reaction.
- 3) Write a note on NK cells.

B) Describe in detail about Rh blood group system.**06****Q.4 A) Attempt any Two of the following.****08**

- 1) Write a note on T lymphocytes.
- 2) Discuss on applications of monoclonal antibodies.
- 3) Write a note on cytokines.

B) Write an essay on "Hybridoma technology for monoclonal antibody production".**08****Q.5 Attempt any Two of the following.****16**

- a) Discuss in detail about anaphylaxis.
- b) Discuss in detail about mechanism of autoimmunity.
- c) Describe the structure and function of primary lymphoid organs.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Special Paper - XI)
Sensors and Transducers (19201550)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to right indicate full marks.
 3) Draw neat labelled diagrams wherever necessary.
 4) Use of log-tables and calculator is allowed.

Q.1 A) Multiple choice questions.

10

- 1) In capacitive transducer, capacitance is varied by changing _____.
 a) Material of the plate b) Distance between the plates
 c) Specific Inductance d) Specific resistance
- 2) The smallest change in a measured variable to which an instrument will respond is _____.
 a) sensitivity b) resolution
 c) error d) precision
- 3) _____ is the passive transducer from the given transducers.
 a) LVDT b) Thermocouple
 c) Photo-voltaic cell d) Piezo-electric transducer
- 4) The principle of operation of an LVDT is based on variation of _____.
 a) Self inductance b) Mutual inductance
 c) Reluctance d) Conductance
- 5) The piezo-electric transducer, formed by the material, having piezo-electric property, _____.
 a) Rochelle-salt b) Barium titanate
 c) Quartz d) All of these
- 6) In case of Resistive Transducers, if length of conductor is increases, then resistance _____.
 a) Decreases b) No change
 c) Increases d) Doubles
- 7) The deviation of the true value from the desired value is _____.
 a) Sensitivity b) Resolution
 c) Error d) Expected value
- 8) The behaviour of a measurement system subjected to rapidly changing input quantity is called _____.
 a) fidelity b) dynamic error
 c) dynamic response d) measurement lag
- 9) The photoconductive material used in LDR is _____.
 a) gallium arsenide b) gallium phosphide
 c) cadmium sulphide d) silicon dioxide

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Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Special Paper – XI)
Operating System (19201545)

Day & Date: Friday, 12-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to right indicate full marks.
 3) Draw neat labeled diagrams wherever necessary.

Q.1 A) Multiple choice questions.**10**

- 1) _____ is also known as PAGE-OUT and PAGE-IN.
 - a) Process
 - b) Overlays
 - c) Paging
 - d) Swapping
- 2) CPU can execute only programs which are stored in _____.
 - a) Ready Queue
 - b) Job Queue
 - c) Main queue
 - d) Device Queue
- 3) A page fault occurs when _____.
 - a) The deadlock happens
 - b) the segmentation starts
 - c) The page is found in memory
 - d) the page is not found in memory
- 4) Dining Philosophers problem can NOT be solved using Two Process solutions.
 - a) True
 - b) False
- 5) The process affects on another and affected by another process is known as independent process _____.
 - a) True
 - b) False
- 6) _____ provides the interface between a running program and O.S.
 - a) System Process
 - b) Overlays
 - c) Kernel
 - d) system calls
- 7) _____ is a process synchronization tool operates on two atomic operations.
 - a) Socket
 - b) Reader
 - c) Writer
 - d) Semaphore
- 8) Single level directory structure is suitable for Multiuser System.
 - a) True
 - b) False
- 9) if time slice is too short in RR scheduling then it suffers from _____.
 - a) High waiting time
 - b) High turnaround time
 - c) High Context Switch time
 - d) High Turned wait time
- 10) For non sharable resources like a printer, mutual exclusion must exist
 - a) Ture
 - b) False

- B) Define the following terms.** **06**
- 1) PCB stands for _____.
 - 2) LRU stands for _____.
 - 3) Waiting Time
 - 4) System Call
 - 5) Dynamic Loading
 - 6) Boot Block

- Q.2 Solve any Eight of the following.** **16**
- a) Define Pre-emptive Scheduling.
 - b) Define Context Switching with its Drawback.
 - c) Define Bad Block.
 - d) List out any FOUR functions of Operating System.
 - e) State function of Short Term Scheduler.
 - f) What is Concurrent Process?
 - g) Define I/O Bound process.
 - h) Define Rotational Latency.
 - i) Define seek time.
 - j) What is Starvation?

- Q.3 A) Attempt any Two of the following.** **10**
- 1) Explain Multiprogramming OS.
 - 2) Write Note on Paging.
 - 3) Consider Following System Snapshot,

Process	A	B	C	D	E
Arrival Time	0	1	2	3	4
CPU Burst	8	20	3	6	12
Priority	1	3	2	5	4

Prepare Gantt chart and calculate Average Waiting and Average Turnaround Time using, Priority Scheduling Algorithm.

- B) Define Deadlock & State its 4 necessary conditions to occur Deadlock.** **06**

- Q.4 A) Attempt any Two of the following.** **08**
- 1) Define Semaphore with its Operations.
 - 2) List out differences between User Thread and Kernel Thread.
 - 3) Draw RAG for following System scenario,
P1 → R1, R2 → P1, P2 → R3, R1 → P3, P4 → R3, R1 → P4

- B) Explain PCB with Diagram.** **08**

- Q.5 Attempt any Two of the following.** **16**
- a) Explain Producer Consumer Problem.
 - b) Explain indexed File Allocation Method.
 - c) Calculate Number of Page Fault Rate for following Reference String with Frame Size = 4 using,
 - 1) FIFO
 - 2) LRU
 - 3) Optimal
 1,2,3,4,2,1,5,6,2,1,2,3,7,6,3,2,1,2,3,6

- B) Fill in the blanks.** **06**
- 1) The betatron accelerates _____ ions.
 - 2) Neutrino has _____ charge.
 - 3) The time at which GM tube unable to count pulse is called _____.
 - 4) In nuclear reaction the bombarding particle is called _____.
 - 5) Antiparticle of electron is _____.
 - 6) Neutron was discovered by _____.

- Q.2 Solve any Eight of the following.** **16**
- a) Define binding energy
 - b) What is stripping reaction?
 - c) Explain exothermic reaction.
 - d) Define threshold energy of nuclear reaction.
 - e) What is need of accelerator?
 - f) State principle of scintillation counter.
 - g) Define recovery time of GM counter.
 - h) What is continuous β - ray spectrum.
 - i) Give two properties of Photons.
 - j) What is nuclear Interaction?

- Q.3 A) Attempt any Two of the following.** **10**
- 1) Calculate Q – value of the following reaction and indicate type of reaction.

$${}_2\text{He}^4 + {}_7\text{N}^{14} \longrightarrow {}_8\text{O}^{17} + {}_1\text{H}^1$$

Given: Mass of ${}_2\text{He}^4 = 4.0038727$ a.m.u.
 Mass of ${}_7\text{N}^{14} = 14.003074$ a.m.u.
 Mass of ${}_8\text{O}^{17} = 16.999133$ a.m.u.
 Mass of ${}_1\text{H}^1 = 1.007825$ a.m.u.
 1 a.m.u = 931 MeV.
 - 2) Show that $Q_\alpha = E_\alpha [1 + M_\alpha / M_Y]$
 - 3) Explain the classification of elementary.

- B) Obtain betatron condition and explain the construction and working of betatron.** **06**

- Q.4 A) Attempt any Two of the following.** **08**
- 1) Explain electrical quadrupole moment.
 - 2) Explain liquid drop model of nucleus.
 - 3) What are quarks? Explain different types of quarks.

- B) Explain construction and working of cyclotron. What are the limitations of cyclotron?** **08**

- Q.5 Attempt any Two of the following.** **16**
- a) Explain properties of elementary particles.
 - b) Explain experimental study of β - decay. Explain Pauli's neutrino hypothesis.
 - c) Explain construction and working of GM counter. Hence explain Geiger plateau region.

- B) Fill in the blank/Definition/One sentence answer/One word answer etc. 06**
- 1) Define current density.
 - 2) Define specific conductance.
 - 3) _____ % sample is used in case of laminar flow burner.
 - 4) Give statement of Faraday's first law.
 - 5) What is second derivative plot in potentiometer?
 - 6) Define transmittance.

Q.2 Solve any Eight of the following. 16

- a) Give the statement of Lambert's law.
- b) Give advantages of potentiometric titration.
- c) Sketch the block diagram of flame photometer.
- d) State the Faraday's second law of electrolysis.
- e) Give the advantage of conductometric titrations.
- f) What is equivalent conductance?
- g) Give the advantages of glass electrode.
- h) What is bright deeping?
- i) Sketch the graph of strong acid versus strong base in conductometry.
- j) Define molar extinction coefficient.

Q.3 A) Attempt any Two of the following. 10

- 1) Explain types of conductivity cell.
- 2) Explain Acid - base titration in potentiometry.
- 3) Describe qualitative and quantitative applications of flame photometry.

B) Describe factors affecting the electroplating. 06

Q.4 A) Attempt any Two of the following. 08

- 1) Sketch and explain the quinhydrone electrode.
- 2) Explain weak acid versus strong base titration in conductometry.
- 3) Cleaning of the article.

B) Write precise note on Beer's law. 08

Q.5 Attempt any Two of the following. 16

- a) Explain electroplating of Nickel.
- b) Explain single cell photoelectric colorimeter.
- c) Discuss general principles of flame photometry.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
BOTANY (Special Paper - XII)
Plant Breeding (19201504)**

Day & Date: Saturday, 13-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple Choice Questions.

10

- 1) In _____ the wheat production increased by about 10 times between 1950 to 1970.
 - a) Mexico
 - b) India
 - c) Japan
 - d) America
- 2) Indian government appointed a commission in _____ for possibility to increase crop yield.
 - a) 1970
 - b) 1960
 - c) 1980
 - d) 1950
- 3) The science of plant breeding exhibit rapid development after rediscovery of mendelian laws in _____.
 - a) 1800
 - b) 1700
 - c) 1900
 - d) 1600
- 4) In India increase per hectre yield in the crop like _____.
 - a) bajara
 - b) paddy
 - c) maize
 - d) all of these
- 5) The important objectives of plant breeding programme is to obtain _____ variety.
 - a) early maturity
 - b) late maturity
 - c) both a and b
 - d) none of these
- 6) Maize is a _____ crop.
 - a) kharif
 - b) rabi
 - c) both a and b
 - d) none of these
- 7) By a plant breeding technique, a variety can be obtained such as _____.
 - a) Greater responsiveness to fertilizers
 - b) Resistance to lodging
 - c) Resistance to disease and pest
 - d) all of these
- 8) The natural resistance through the _____ characters is stable.
 - a) genetical
 - b) cytological
 - c) physiological
 - d) ecological

- B) Answer the following questions.** **06**
- 1) What is mean by pulse legumes?
 - 2) What are Textile fibres?
 - 3) Give the source of Soybean oil plants.
 - 4) State the botanical name Palas.
 - 5) State the source of drug of Clove.
 - 6) What are plant insecticides?
- Q.2 Solve any Eight of the following.** **16**
- a) What is mean by fodder legume? Give its two examples.
 - b) Give the botanical name, family, and source of cotton.
 - c) State the botanical name and source of drug of Ashwagandha.
 - d) State the botanical name and source of drug of Gulvel.
 - e) State the botanical name and source of drug of Ginger.
 - f) What are plant dyes?
 - g) Give the botanical name of plant insecticides.
 - h) What is mean by natural dyes?
 - i) Give the botanical name of Heena.
 - j) Give the botanical name of Manjistha.
- Q.3 A) Attempt any Two of the following.** **10**
- 1) Give the botanical name, source and economic importance of Bengal gram.
 - 2) Give economic importance of coir.
 - 3) Give the economic uses of Groundnut.
- B) Short note/Solve.** **06**
- Give a brief account of drugs obtained from rhizome, state botanical name, chief chemical constituents.
- Q.4 A) Attempt any Two of the following.** **08**
- 1) Give the botanical name, and economic importance of *Cajanus cajan*.
 - 2) Give the botanical name, and economic importance of Coir.
 - 3) Give the botanical name, and economic importance of Soybean.
- B) Describe/Explain/Solve.** **08**
- Give a brief account of drugs obtained from fruit, state botanical name, chief chemical constituents.
- Q.5 Attempt any Two of the following.** **16**
- a) Give a general account of plant insecticides with suitable examples and their advantages.
 - b) Give a brief account of rubber plant sources and their importance.
 - c) Give a general account of dyes obtained from different plants. Add a note on their uses.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Special Paper - XII)
Partial Differential Equations (19201527 - A)

Day & Date: Saturday, 13-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Select the correct alternative for each of the following. 10

- 1) The solution of auxiliary equation $yzp + z \times q = xy$ is _____.
 a) $\phi(x^2 - y^2, x^2 - z^2) = 0$ b) $\phi(x^3 - y^3, x^2 - z^2) = 0$
 c) $\phi(x^2 + y^2, x^2 - z^2) = 0$ d) None of these
- 2) In a first order partial differential equation $f(x, y, z, p, q) = 0$ is linear in p and q then the equation is known as _____.
 a) Linear equation b) Semi linear equation
 c) Quasi linear equation d) Non linear equation
- 3) When number of arbitrary constant is equal to the number of independent variables then by eliminating arbitrary constant are get _____.
 a) more than one partial differential equation of order one
 b) unique partial differential equation of order one
 c) partial differential equation of order greater than one
 d) unique partial differential equation of order greater than one
- 4) The equation $P_p + Q_q = R$ is known as _____.
 a) Charpit's equation b) Bernoulli's equation
 c) Lagrange's equation d) Clairaut's equation
- 5) The standard form II of non linear partial differential equation of order one is _____.
 a) $z = px + qy + f(p, q)$ b) $z = f(p, q)$
 c) $z = px + q^2y + f(p, q)$ d) $z = px - qy - f(p, q)$
- 6) The integral which does not contains an arbitrary constant is called _____.
 a) complete integral b) singular integral
 c) general integral d) particular integral
- 7) The complete integral of $pq = k$ is _____.
 a) $z = ax - \frac{k}{a}y + c$ b) $z = ax - \frac{a}{k}y + c$
 c) $z = ax + \frac{k}{a}y + c$ d) $z = ax + \frac{a}{k}y + c$
- 8) In $f(DD')$ if roots are repeated twice times then C.F. = _____.
 a) $z = \Psi_1(y + mx) + \Psi_2(y + mx)$
 b) $z = \Psi_1(y + mx) + x\Psi_2(y + mx)$
 c) $z = \Psi_1(y + mx) + \Psi_2(y + mx) + \dots + \Psi_n(y + mx)$
 d) None of these

- B) For homogeneous linear partial differential equation with constant coefficient 08
if $f(a, b) = 0$ then prove that $\frac{1}{(bD - aD')^n} \phi(ax + by) = \frac{x^n}{b^n n!} \phi(ax + by)$

Q.5 Attempt any two of the following.

16

- a) Explain the Charpit's method for solving the non-linear partial differential equation of order one.
- b) Explain method of solution of Lagrange's partial differential equation $P_p + Q_q = R$ with usual notation.
- c) Attempt the following.
- 1) Solve $(D^2 - D'^2 - 3D')Z = e^{x+2y}$
 - 2) Solve $r - 2s + t = \sin(2x + 3y)$

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
Mathematics (Special Paper - XII)
Mathematical Analysis (19201527 - B)

Day & Date: Saturday, 13-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Select the correct alternative for each of the following. 10

- 1) If f is derivable at c and $f(c) \neq 0$ then the function $\frac{1}{f}$ is also derivable there at end _____.
- a) $\left(\frac{1}{f}\right)' c = -\frac{f'(c)}{f(c)}$ b) $\left(\frac{1}{f}\right)' c = -\frac{1}{\{f'(c)\}^2}$
 c) $\left(\frac{1}{f}\right)' c = \frac{1}{\{f(c)\}^2}$ d) $\frac{-f'(c)}{\{f(c)\}^2}$
- 2) If f is continuous on $[a, b]$ and $f(x) \in [a, b]$ for every $x \in [a, b]$ then f has a fixed point $C \in [a, b]$ such that $f(c) = c$ is called _____.
- a) Intermediate value theorem
 b) Rolle's theorem
 c) Bolzano Wierstrass theorem
 d) Fixed point theorem
- 3) The term $R_n = \frac{h^n(1-\theta)^{n-1}}{(n-1)!} f^n(a + \theta h)$ is called _____.
- a) Rolle's form of remainder
 b) Lagrange's form of remainder
 c) Cauchy's form of remainder
 d) Roche form of remainder
- 4) The exponential function $E(1)$ is _____.
- a) 1 b) ∞
 c) $-\infty$ d) e
- 5) $\lim_{x \rightarrow \frac{\pi}{2}} \tan x =$ _____.
- a) -1 b) 1
 c) ∞ d) $-\infty$
- 6) For the function $f(x) = 3x^2 - 2x^3$ for $-2 \leq x \leq 2$ $V(f, -2, 1) =$ _____.
- a) 28 b) 29
 c) 2 d) 14
- 7) $\lim_{x \rightarrow 0^+} \frac{\sin x}{\sqrt{x}} =$ _____.
- a) 1 b) $\sqrt{2}$
 c) 0 d) ∞

B) State and prove Cauchy's mean value theorem. **06**

Q.4 A) Attempt any two of the following. **08**

- 1) Let $f: [0, 2] \rightarrow R$ be differentiable with $f(0) = 0$, $f(1) = 2$, and $f(2) = 1$ then prove that there exist $c \in [0, 2]$ such that $f'(c) = \frac{1}{2}$
- 2) Prove that the product of two function of bounded variation is also of bounded variation.
- 3) Prove that a function which is derivable at a point is necessarily continuous at that point.

B) If $\lim_{x \rightarrow a} f(x) = L$, $\lim_{x \rightarrow 0} g(x) = M$ then prove that $\lim_{x \rightarrow a} (f \cdot g)(x) = L \cdot M$ and **08**

$$\lim_{x \rightarrow a} \left(\frac{f}{g} \right) (x) = \frac{L}{M} \text{ provided } M \neq 0$$

Q.5 Attempt any two of the following. **16**

- a) State and prove Taylor's theorem remainder after n terms.
- b) Assuming f'' to be continuous on $[a, b]$ show that $f(c) - f(a) \frac{b-c}{b-a} - \frac{c-a}{b-a} f(b) = \frac{1}{2}(c-a)(c-b)f''(r)$ where c and r both lie in $[a, b]$
- c)
 - 1) Show that the function $f(x) = \frac{1}{x}$ is not uniformly continuous.
 - 2) Determine all the value of c which satisfies the conclusion of mean value theorem for the function $f(x) = x^3 + 3x^2 - x$ on $[-1, 2]$

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper - XII)
Operations Research (19201531)

Day & Date: Saturday, 13-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple Choice questions.**10**

- 1) To convert \geq inequality constraints into equality constraints, we must
 - a) add a surplus variable
 - b) subtract an artificial variable
 - c) subtract a surplus variable and add an artificial variable
 - d) add a surplus variable and subtract an artificial variable
- 2) Constraints in an LP model represents _____
 - a) limitations
 - b) requirements
 - c) balancing limitations and requirements
 - d) All of the above
- 3) The solution to a transportation problem with m -rows (Supplies) and n - columns (destination) is feasible if number of positive allocations are _____
 - a) $m + n$
 - b) $m \times n$
 - c) $m + n - 1$
 - d) $m + n + 1$
- 4) For any primal problem and its dual, _____
 - a) Optimal value of objective function is same
 - b) Primal will have an optimal solution if and only if dual does too
 - c) both primal and dual cannot be infeasible
 - d) all of the above
- 5) If there were n workers and n jobs there would be _____
 - a) $n!$ solutions
 - b) $(n - 1)!$ solutions
 - c) $(n !)^n$ solutions
 - d) n solutions
- 6) When total supply is equal to total demand in a transportation problem, the problem is said to be _____
 - a) balanced
 - b) unbalanced
 - c) degenerate
 - d) none of the above
- 7) Monte Carlo is _____
 - a) a technique for modeling
 - b) a book
 - c) a technique for Simulation
 - d) None of these
- 8) Which of the following method is method of obtaining initial basic feasible solution to transportation Problem?
 - a) Hungarian
 - b) North- West
 - c) Simplex
 - d) Newton Raphson

Q.4 A) Attempt any Two of the following. 08

- 1) Write the steps involved in the Procedure of Monte Carlo Simulation.
- 2) Write the dual of following LPP:
 Maximize $Z = 3x_1 + 2x_2$
 Subject to the constraints,

$$-2x_1 + 3x_2 \leq 9$$

$$x_1 - 5x_2 \geq -20$$

$$x_1, x_2 \geq 0$$
- 3) Write the procedure of processing n jobs on M machines.

B) Solve Following LPP 08

- Maximize $Z = 5x_1 - 2x_2$
 Subject to the constraints,

$$4x_1 + x_2 \geq 6$$

$$4x_1 + 3x_2 \geq 5$$

$$x_1, x_2 \geq 0$$

Q.5 Attempt any Two of the following. 16

- a) The probabilities of three states of nature are 0.1, 0.7, 0.2 respectively. Calculate EMV, EOL and EVPI.

States of Nature	Acts		
	A ₁	A ₂	A ₃
E ₁	25	-10	-125
E ₂	400	440	400
E ₃	650	740	750

- b) Explain Big M method of finding an optimum solution of a LPP.
- c) Find the optimal sequence in performing the following five jobs on two machines. Processing times (in hours) are given in the following table:

Job	1	2	3	4	5
Machine M1	5	10	6	7	11
Machine M2	8	6	2	3	4

Also find total elapsed time and idle times for both machines.

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper - XII)
Regression Analysis (19201532)

Day & Date: Saturday, 13-04-2024
 Time: 03:00 PM To 6:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labeled diagrams wherever necessary.
 4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the following. 10

- 1) Backward elimination process begins with the assumption that _____.
 - a) no regressors are in the model
 - b) some regressors are in the model
 - c) all regressors are in the model
 - d) None of These
- 2) Value of adjusted R^2 always lies between _____.
 - a) 0 and 1
 - b) -1 and 1
 - c) 0 and ∞
 - d) $-\infty$ and ∞
- 3) Regression means _____.
 - a) relation between variables
 - b) relation between dependent and independent variables
 - c) relation between dependent variables
 - d) all the above
- 4) In simple linear regression model $Y = \beta_0 + \beta_1 X + \varepsilon$, β_0 and β_1 are respectively _____.
 - a) response variable and regressor variable
 - b) response variable and predictor variable
 - c) intercept and slope
 - d) none of the above
- 5) Forward selection method always begins with the assumption that _____.
 - a) no regressors are in the model
 - b) some regressors are in the model
 - c) all regressors are in the model
 - d) None of These
- 6) Hat matrix is given by _____.
 - a) $X(X'X)^{-1}$
 - b) $X'(X'X)^{-1}$
 - c) $X'(X'X)^{-1}X$
 - d) $X(X'X)^{-1}X'$
- 7) The sum of residuals weighted by the corresponding value of the regressor is always equal to _____.
 - a) 0.5
 - b) 0
 - c) 1
 - d) -1

- B)** Define odds ratio, Ψ . Write its interpretation if: **08**
- i) $\Psi = 1$
 - ii) $\Psi > 1$
 - iii) $\Psi < 1$

Q.5 Attempt any Two of the following. **16**

- a)** Derive the maximum likelihood estimators of parameters of a logistic regression model with one covariate.
- b)** Explain the concept of the simple linear regression with illustrations. Derive least square estimators of the regression coefficients in the model
- c)** Describe a multiple linear regression model. Stating the assumptions, obtain the least square estimator of (LSE) $\hat{\beta}$ of β .

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B.Sc. (Semester - V) (New) (CBCS) Examination- March/April - 2024
Geology (Special Paper - XII)

Applied Geology - Prospecting and Mining Geology (19201537)

Day & Date: Saturday, 13-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculator is allowed.

Q.1 A) Choose correct alternatives.

10

- 1) Prospecting based on geological maps with scale of 1:50,000 is called _____ survey.

a) Reconnaissance	b) Preliminary
c) Detailed	d) None of the above
- 2) Oil shales are known from Lower Silurian is the best example of which of the following geological criteria?

a) Climatic	b) Structural
c) Stratigraphic	d) Lithological
- 3) _____ is a horizontal opening driven from a shaft and (or near) right angles to the strike of a vein or other ore body.

a) Adit	b) Crosscut
c) Shaft	d) Chute
- 4) Which of the following instrument used for magnetic method?

a) Torsion balance	b) Proton magnetometer
c) Pendulum	d) None of the above
- 5) In the curve-matching technique if $\rho_1 > \rho_2 > \rho_3$, the curve type is:

a) 'Q' type	b) 'H' type
c) 'A' type	d) 'K' type
- 6) The spacing of the trenches pits and boreholes depend on:
 - a) The length of the ore body.
 - b) The modes of occurrence of the deposits.
 - c) The depth of the deposits.
 - d) The outcrops of the deposit.
- 7) Which of the following criteria is used for coal deposits?

a) Climatic criteria	b) Lithological criteria
c) Stratigraphic criteria	d) All of the above
- 8) When the material collected to represent a rock type, or formation or an ore body in the quantitative sense then it is termed as:
 - a) Specimen
 - b) Sample
 - c) Both specimen and sample can be used
 - d) Quantitative specimen

- 9) Acid mine drainage is the result of _____
- ash and air debris creating acid rain
 - boulders and debris blocking the flow of rivers / streams
 - toxins from water in mines drain into streams
 - minerals from mining being left behind creating pollution
- 10) In geophysical investigation, artificial signals are introduced into the earth and subsequently recorded after being modified by the earth materials.
- Gravity method
 - Magnetic method
 - Self potential method
 - Seismic method

B) Fill in the blanks:

06

- In resistivity method, a series of measurements of resistivity are made with a constant electrode spacing moving the whole of the electrode arrangement.
- _____ elements/minerals provide good clues in search for hidden ore bodies because they generally form large haloes.
- In _____ configuration of resistivity survey, the current and potential electrode pairs have a common mid-point and the distance between adjacent electrodes are equal.
- _____ sampling which best suited to bedded, banded and vein type of deposits.
- A criteria covers the geological settings associated primarily with the age of various sedimentary series (or intrusions) enclosing a mineral.
- Which mining method is most likely to destroy the habitat of wildlife?

Q.2 Solve any Eight of the following.

16

- Define Curie point.
- Name the types of electrical configuration methods.
- Give two examples of magmagenic geological criteria.
- Name the instrument used in Magnetic methods of exploration.
- Name any two types of mining used to extract the ore minerals.
- Give two examples of path finder elements.
- What is mean by geochemical mobility?
- Name any two data corrections of gravity geophysical method.
- Which two geophysical methods are used for prospecting oil and gas deposits?
- Give two applications of Seismic geophysical method.

Q.3 A) Attempt any Two of the following.

10

- Discuss the interpretation of gravity geophysical survey.
- Explain the primary and secondary dispersion halos of geochemical exploration.
- Describe the environmental impact of acid mine drainage.

B) Write short note on Wenner electrical resistivity method.

06

Q.4 A) Attempt any two of the following.

08

- Explain the principle of Self potential method with suitable diagram.
- Write the note on structural criteria of geological prospecting
- Discuss in detail open cast mining and its types.

B) Define sampling. Explain the different types of sampling with suitable diagram.

08

Q.5 Attempt any two of the following.

- a) Discuss the instrumentation, field procedure and application of Seismic methods.
- b) Explain lateral exploration and vertical exploration of electrical resistivity method.
- c) Explain any three geological criteria for coal deposits.

- B) Write true or false** **06**
- 1) The recovery of ethanol is carried out by using distillation.
 - 2) Insulin is produced by liver cell.
 - 3) The undesirable change occurs in food which make the food unsafe for consumption is called as food infection.
 - 4) The recovery of streptomycin is carried out by ion exchange chromatography.
 - 5) The conversion of milk to curd is carried by lipase enzyme.
 - 6) Sham test is used for carcinogen testing.
- Q.2 Solve any Eight of the following.** **16**
- a) Enlist the types of wine.
 - b) Which organism is responsible for ropiness in milk?
 - c) Define food poisoning.
 - d) Define sterility test.
 - e) What are the sources of milk spoilage?
 - f) What is precipitation?
 - g) Enlist types of microorganism involved in curd production.
 - h) Give two examples of chemical food preservative.
 - i) What is crystalization?
 - j) Enlist major bacterial pathogen which causes spoilage of meat and eggs.
- Q.3 A) Attempt any Two of the following.** **10**
- 1) Give a detailed account on food as substrate for growth of microorganism.
 - 2) Discuss in detail fermentation of bread.
 - 3) Describe in detail recovery and purification of product by chromatography.
- B) Discuss in recovery of ethanol by distillation process.** **06**
- Q.4 A) Attempt any Two of the following.** **08**
- 1) What is aminoglycoside? Describe in details production of streptomycin.
 - 2) Discuss in details production of cheese.
 - 3) Give a detailed account on food spoilage by *Claustridium botulinum*.
- B) Explain in detail production of insulin by r-DNA technology** **08**
- Q.5 Attempt any Two of the following.** **16**
- a) Discuss in details wine production.
 - b) Describe in detail principle and method of food preservation.
 - c) What is downstream process? Explain in details filtration used as recovery process.

Seat
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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Special Paper - XII)
Electronics Communication (19201552)

Day & Date: Saturday, 13-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 A) Choose correct alternatives.**10**

- 1) _____ is not used in modern telephone.
 - a) Dial tone
 - b) Busy tone
 - c) Pulse tone
 - d) Ring tone
- 2) The hybrid in telephone hand set is _____.
 - a) Special transformer
 - b) Transistor
 - c) Relay
 - d) MOSFET
- 3) In TV 4:3 represents _____.
 - a) Interlace ratio
 - b) ratio of two diagonal
 - c) aspect ratio
 - d) Field ratio
- 4) A super heterodyne receiver with IF of 450 KHz is tuned to signal of 1200 KHz, the image frequency is _____.
 - a) 750 KHz
 - b) 2100 KHz
 - c) 1650 KHz
 - d) 450 KHz
- 5) D layer in ionosphere present largely _____.
 - a) All The day
 - b) During day
 - c) During night
 - d) none
- 6) Current distribution in half wave dipole antenna is _____.
 - a) Uniform
 - b) Not uniform
 - c) Both
 - d) None
- 7) To eliminate draw backs of low frequency signal and to radiate them _____ is necessary.
 - a) modulation
 - b) multiplexing
 - c) demultiplexing
 - d) detection
- 8) Over modulation occurs when _____.
 - a) $E_m > E_c$
 - b) $E_m < E_c$
 - c) $E_m = E_c$
 - d) none
- 9) The electronic communication that takes place in two way is _____.
 - a) multiplex
 - b) simplex
 - c) duplex
 - d) None of these
- 10) Noise is mostly introduced in _____.
 - a) channel
 - b) transmitter
 - c) receiver
 - d) both

- B) Answer in one sentence. 06**
- 1) What is full form of TDM and FDM?
 - 2) What is importance of modulation?
 - 3) What is the role of ringer in telephone hand set?
 - 4) Define aspect ratio.
 - 5) List the parameters of antenna.
 - 6) Define noise. List its types.
- Q.2 Solve any Eight of the following. 16**
- a) What are different layers of ionosphere?
 - b) What is skip distance? Give its formulae.
 - c) Why AGC is used in radio receiver?
 - d) Give composition of blanking pulse period.
 - e) What is principle of telephone communication?
 - f) What are the types of electronic communication system?
 - g) What is local loop?
 - h) Define PAM and PPM.
 - i) What are merits and demerits of FM?
 - j) Define Signal to noise ratio.
- Q.3 A) Attempt any two of the following. 10**
- 1) Explain concept of PCM.
 - 2) Explain any five receiver characteristics of Radio receiver.
 - 3) Explain tropospheric wave radio propagation.
- B) Explain ratio detector. 06**
- Q.4 A) Attempt any two of the following. 08**
- 1) The output voltage of transmitter is given by $500(1 + 0.4 \sin 3140t) \sin(6.28 \times 10^7)t$ feed to load resistance of 600Ω .
Find: 1) f_c 2) f_m 3) M_I 4) E_c
 - 2) Explain basic action of antenna.
 - 3) Explain electronic communication system with proper block diagram.
- B) Explain composite video signal used in TV transmission. 08**
- Q.5 Attempt any two of the following. 16**
- a) What is scanning? What are its types? Explain Interlaced scanning.
 - b) What is radio wave propagation? What are its types? Explain space wave propagation.
 - c) What is modulation? What are its types? Explain Amplitude modulation in detail.

- Q.2 Solve any Eight of the following. 16**
- Define String literals.
 - Define Pass statement.
 - Characteristics of Lists.
 - What is set?
 - Explain abs() Function with example.
 - How to get the current time?
 - Explain the import statement.
 - Explain any four Common Exceptions.
 - Explain Python Multi-Level inheritance.
 - Explain Python pow() Function with example.
- Q.3 A) Attempt any Two of the following. 10**
- Explain local and global variable in python with example.
 - What is loop? Explain different types of loops used in python.
 - Explain math module with example.
- Q.3 B) Short note/Solve. 06**
- What is inheritance? Explain all types of inheritance.
 - What is difference between tuple and list?
- Q.4 A) Attempt any Two of the following. 08**
- What is exception? Explain various keywords to handle exception.
 - Explain any five methods of Dictionary with suitable example.
 - Explain the characteristics of python.
- B) Explain following File Handling operations & Access mode in python with example. 08**
- Open a file
 - Read or write - Performing operation
 - Close the file
 - file Access mode
- Q.5 Attempt any Two of the following. 16**
- How to reverse a number in Python. Write a program algorithm with example.
 - What is module? What are the advantages of module? Write a program for importing multiple modules.
 - Define Regular Expressions. Explain Regex Functions with example.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
Certificate Course in Testing and Repairs of Electric Appliances
(Special Paper - XI) (19201515)**

Day & Date: Monday, 15-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:**
- 1) All questions are compulsory.
 - 2) Draw neat labelled diagrams wherever necessary.
 - 3) Figures to the right indicate full marks.
 - 4) Use of log table and calculator is allowed.

Q.1 A) Choose correct alternatives. 10

- 1) Human body is _____.
 - a) a good conductor of electricity
 - b) sometimes good conductor
 - c) bad conductor of electricity
 - d) electrical insulator
- 2) An electrician wears a rubber glove while doing electrical repairs to _____.
 - a) save electricity
 - b) prevent himself from shock
 - c) just make fun
 - d) keep away from getting dirty
- 3) Which of the following is the ideal value of earthing resistance used for large power stations?

a) 0.5 Ω	b) 10000 Ω
c) 20000 Ω	d) 30000 Ω
- 4) If two resistances: R_1 and R_2 , are connected in series then the resultant resistance of this series combination will be _____.

a) $R_1 + R_2$	b) $R_1 - R_2$
c) R_1 / R_2	d) $R_1 * R_2$
- 5) A faulty supply cable, of electric iron, needs to be tested to remove the fault. Which will be the most important testing required?

a) light testing	b) continuity testing
c) rotary testing	d) pressure testing
- 6) A resistance is carrying current of 2 A and has 10 V potential drop across it. How much will be its resistance?

a) 2 Ω	b) 5 Ω
c) 7.5 Ω	d) 0.2 Ω
- 7) Magnetism of a magnet is destroyed by _____.
 - a) heating
 - b) by inductive action of another magnet
 - c) hammering
 - d) by all above methods

- Q.3 A) Attempt any Two of the following. 10**
- 1) Write a note on electrical Insulators.
 - 2) Explain repairing steps of ceiling fan.
 - 3) With neat diagram explain working of tube light.
- B) Explain working of mixer. 06**
- Q.4 A) Attempt any two of the following. 08**
- 1) Discuss different electrical quantities and their units.
 - 2) With neat diagram explain working of table fan.
 - 3) Discuss different parts of air cooler.
- B) Explain use of a resistor in an electric circuit. 08**
- Q.5 Attempt any two of the following. 16**
- a) Discuss different safety rules of electricity.
 - b) With neat diagram explain construction and working of automatic iron.
 - c) Draw neat diagram of hair dryer and explain its principle of working.

Seat No.	
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Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
Thin Film Deposition and Characterization Techniques
(Special Paper - XI) (19201516)

Day & Date: Monday, 15-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 A) Multiple choice questions.**10**

- 1) _____ is the primary advantage of using thin films in the electronic industry.
 - a) Increased thermal resistance
 - b) Lower electrical conductivity
 - c) Reduce cost of manufacturing
 - d) Enhanced mechanical strength
- 2) _____ is the sector in which thin film play crucial role in enhancing solar cell efficiency.
 - a) Healthcare
 - b) Automotive
 - c) Agriculture
 - d) Renewable energy
- 3) _____ property is crucial for thin film used in electronic circuit to allow controlled charge flow.
 - a) Low electrical resistivity
 - b) Optical transparency
 - c) High thermal conductivity
 - d) Chemical stability
- 4) The Sol-Gel method can be applied to a wide range of materials, including _____.
 - a) only metals and alloys
 - b) metal, ceramics, polymers and composites
 - c) only ceramics
 - d) only polymers
- 5) _____ utilizes sound waves to generate cavitation bubbles that agitate the liquid and remove particles adhering to the substrate's surface.
 - a) Ultrasonic cleaning
 - b) High-pressure water jetting
 - c) Chemical cleaning
 - d) Electrochemical cleaning
- 6) _____ factor determines the thickness and quality of the deposited thin film in spray pyrolysis.
 - a) Solar radiations
 - b) Substrate colour
 - c) Precursor solution concentration
 - d) Ambient humidity

- 7) A surface with a water contact angle of around 150 deg. or more is considered as _____.
a) superhydrophilic b) hydrophilic
c) hydrophobic d) superhydrophobic
- 8) _____ significantly affects the electrical resistivity of the material.
a) Magnetic susceptibility b) Temperature
c) Refractive index d) Density
- 9) _____ type of electron are used to generate images in SEM.
a) X-rays b) Infrared
c) Gamma rays d) Backscattered and secondary
- 10) _____ method is often used for non-conductive substrates as it removes contaminants without physical contact.
a) Abrasive scrubbing b) Ultrasonic cleaning
c) Plasma cleaning d) Chemical etching

B) Fill in the blank/Definition/ One sentence answer/One word answer/Give the name/Predict the product etc. 06

- 1) What does SEM stand for in microscopy?
- 2) Write any ONE example of top-down method.
- 3) What unit is commonly used to express electrical resistivity?
- 4) What type of solution is commonly used in CBD to deposit thin films?
- 5) What is the purpose of substrate cleaning in manufacturing processes?
- 6) In which sector are thin films commonly used for corrosion protection and wear resistance?

Q.2 Attempt any EIGHT of the following. 16

- a) Define thin film and mentions any two applications of it.
- b) What is nucleation?
- c) Write any two disadvantages of physical techniques over chemical techniques.
- d) Mention the parameters used in the formation thin films by CBD.
- e) What does the term "Ionic" refer to in SILAR method?
- f) How do deposition temperatures generally compare between Sol-gel and Spray pyrolysis method?
- g) What information can X-ray diffraction provide about a material?
- h) What is a "lotus effect" in relation to water contact angle?
- i) What is the optical band gap of a material?
- j) Why is material selection important in engineering and design?

Q.3 A) Attempt any Two of the following. 10

- 1) Explain conductive substrate cleaning process.
- 2) Explain construction of UV-visible spectrophotometer with labelled diagram.
- 3) Discuss importance of thin film in various sectors.

B) Calculate the electrical resistivity of a copper wire with a length of 10 meters and a cross-sectional area of 2 mm². The resistance of the wire is measured to be 0.5 ohms. 06

- Q.4 A) Attempt any two of the following. 08**
- 1) Draw the neat diagram of SEM and write the principle of it.
 - 2) The X-ray with a wavelength of 0.154 nm is incident on a crystal lattice. The first order diffraction peak is observed at an angle of 20 deg. Calculate the spacing between the crystal lattice planes.
 - 3) A liquid droplet is placed on a solid surface; contact angle is measured to be 40 deg. Determine the wetting property of the surface.
- B) Describe the Chemical Bath Deposition (CBD) method, including its principle, working and applications. 08**
- Q.5 Attempt any two of the following. 16**
- a) Describe the spray pyrolysis method with labelled diagram.
 - b) Explain bottom-up and top-down approaches of thin films.
 - c) Discuss four probe method for electrical resistivity.

- 10) Bibliography is: _____
- At the end of the study arranged in alphabetical order
 - Anywhere in the study
 - Beginning of the study
 - Not necessary to be included

B) Fill in the blank/ Definition/One sentence answer/One word answer/Give the name/Predict the product etc. 06

- The graph can be copied from Origin and added in the MS word using _____.
- _____ is the first step of Research process.
- Population Census is an example of _____ type of research.
- _____ is a quality of Good Researcher.
- In MS Excel, the content of the cell is shown in _____.
- Origin can produce _____ graphs.

Q.2 Solve any Eight of the following. 16

- What is referencing in the research paper? Where the references are mentioned?
- What is research?
- Name any four types of reports.
- What is Scopus?
- How do you add pictures and formula in the technical report writing?
- What are the advantages of origin over MS Excel?
- Name the chart elements in MS excel.
- Name two software's for plotting graph.
- What is worksheet in MS excel?
- How the table of three rows and two columns are inserted in the research paper?

Q.3 A) Attempt any Two of the following. 10

- Explain the steps involved in preparing technical report writing.
- A report is prepared using MS-word and excel. Give the steps to add equations, tables, different types of graphs in the report.
- What is literature review? How it can be carried out? Explain.

B) What are the contents of the research paper? Briefly explain each one. 06

Q.4 A) Attempt any Two of the following. 08

- A group of 10 people have health benefits by exercise in gym, skipping, yoga, running, walking, dieting practices every day. They scored points from 1 to 50. Prepare a table using MS excel and prepare a pie chart using the scores mentioned in your excel sheet.
- Plot the graph using MS-excel for the degree students result analysis in 1st class, 2nd class, Distinction etc. (Consider 12 students in the class)
- Write Short note on scientific writing. Give few examples using scientific words.

B) Write the steps involved in preparing power point presentation of a research paper in a national level conference. In detail explain the preparation of first slide of the presentation. 08

Q.5 Attempt any Two of the following.

- a) With an example describe how the power point presentation of ten slides can be prepared for a presentation on a research topic? Specifically, explain how the first and last slide of the presentation should be prepared?
- b) What is a research paper? Explain peer review process and publication process for the research paper/article in any journal?
- c) What is a project? Explain in detail the procedure to prepare project report.

Seat
No.

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
Energy Resources (Special Paper - XI) (19201519)

Day & Date Monday, 15-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions.**10**

- 1) Nuclear energy is derived by _____.
 a) combustion of atoms of U 235
 b) fission of atoms of U 235
 c) fusion of atoms of U 235
 d) the breaking of U 235 bonds
- 2) Which of the following energy sources does not produce carbon dioxide?
 a) Oil
 b) Uranium
 c) Coal
 d) Natural gas
- 3) What type of energy is derived from heated groundwater?
 a) solar energy
 b) geothermal energy
 c) hydroelectric energy
 d) nuclear energy
- 4) Ozone layer occurs in _____.
 a) Ionosphere
 b) Stratosphere
 c) Thermosphere
 d) Troposphere
- 5) Which of the following is a nonrenewable energy resource?
 a) solar
 b) methane
 c) hydroelectric
 d) coal
- 6) This is an example of non-polluting renewable type of energy.
 a) tidal
 b) wind
 c) solar
 d) All of these
- 7) Trapped heat inside the earth is known as _____.
 a) Heat energy
 b) Kinetic energy
 c) Geothermal energy
 d) Thermal energy
- 8) Renewable source of energy is _____.
 a) Petroleum
 b) Coal
 c) Nuclear fuel
 d) Trees
- 9) Which type of wind machines are used at several residence or local use?
 a) Large size machines
 b) Remote machines
 c) Small size machines
 d) Medium size machines

- 10) What does OTEC stand for?
- Ocean thermal energy cultivation
 - Ocean thermal energy conversion
 - Ocean techno energy conservation
 - Ocean thermal energy consumption

B) Fill in the blank.**06**

- Natural gas, oil and _____ are nonrenewable energy resources.
- Soil conservation is the process where _____ is protected against loss.
- The major constituent of biogas is _____, CO₂ and some traces of gases such as H₂S and ammonia.
- How many forms of fossil fuels are there _____.
- _____ type of resource is iron ore.
- _____ resource is a finite resource.

Q.2 Solve any Eight of the following.**16**

- Define solar energy. How is it utilised?
- Hydropower is a renewable source of energy. Justify.
- What are the advantages of nuclear energy?
- Write two advantages of using a solar cooker?
- What is Geothermal Energy?
- Define OTE (ocean thermal energy).
- Mention any two reasons, why wood is not preferred as fuel?
- Give any two examples of renewable energy resources.
- Define Solar Constant.
- Define fill factor and efficiency of solar cell.

Q.3 A) Attempt any Two of the following.**10**

- Give difference between Renewable and Non-Renewable Sources.
- What is biogas? How can biogas be obtained?
- Write any five characteristics of good source of energy.

B) Write short note on geothermal energy.**06****Q.4 A) Attempt any Two of the following.****08**

- Write any four disadvantages of fossil fuels.
- What are the limitations of energy derived from oceans?
- What is the difference between tide and wave? And what are the limitations of extracting energy from tides and waves?

B) Describe construction and working of solar cooker with neat labeled diagram.**08****Q.5 Attempt any Two of the following.****16**

- What is photovoltaic cell? Explain the principle and characteristics of the solar photovoltaic cell.
- Briefly describe solar, wind and biomass energy.
- Draw the line diagram and explain the working of hybrid OTEC cycle and list out the major problems associated OTEC.

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Set P

**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
Geoinformatics (Special Paper - XI) (19201538)**

Day & Date: Monday, 15-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 40

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

Q.1 A) Fill in blanks. 05

- 1) A trend of fault line can be represented by _____ in GIS structural mapping.
 - a) point
 - b) line
 - c) polygon
 - d) none of these
- 2) Sand along river bank show _____ tone in the aerial photograph.
 - a) black
 - b) light
 - c) moderate
 - d) bright
- 3) In the high oblique aerial photographs, tilt angle of the axis is _____.
 - a) 20° - 30°
 - b) 30° - 40°
 - c) 40° - 60°
 - d) 60° - 90°
- 4) In visible region, the blue light is having a wave length range of _____.
 - a) 0.42-0.52 μm
 - b) 0.42-0.92 μm
 - c) 0.22-0.32 μm
 - d) None of the above
- 5) A pocket stereoscope is used to view _____.
 - a) digital satellite data
 - b) microscopic minerals
 - c) fine grained minerals in the field.
 - d) hard copy of aerial data

B) Answer the following questions in one sentence. 03

- 1) On what basis aerial photographs are classified as vertical and oblique?
- 2) Name the study of the characters / interpretation of the geological features on earth surface using the aerial photographs.
- 3) What is the scale of large-scale aerial photographs?

Q.2 Answer any four of the following. 08

- a) What is the term used for surveying and mapping using aerial photographs.
- b) Name the two infrared (IR) bands in LANDSAT?
- c) Identify the structure when beds dipping away from a common linear axis.
- d) What is mosaic?
- e) What is the colour of water bodies in IR colour image?

Q.3 A) Attempt any One of the following. 05

- 1) What is Atmospheric window?
- 2) Describe various error in flying.

B) Explain any temporal and spatial resolution of digital imagery. 03

Q.4 Attempt any two of the following. 08

- a) Explain in detail overlap? What are their types? Why overlap is required?
- b) Describe various platforms of remote sensing.
- c) What is spectral reflectance curve?

Q.5 Attempt any One of the following. 08

- a) Describe any four drainage patterns & their significances.
- b) Describe any three uses of aerial photographs in Geology.
- c) Describe tone and texture with examples and uses in identification of features.

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Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
LINUX (Special Paper - XI) (19201547)

Day & Date: Monday, 15-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Multiple choice questions.**10**

- 1) _____ is a Linux desktop environment.
 - a) XFCE
 - b) Gnome
 - c) KDE
 - d) All of these
- 2) The statement `z='expr 5/2'` would store which of the following values in z?
 - a) 0
 - b) 1
 - c) 2
 - d) 2.5
- 3) In the command '`mv source target`', if source is a directory and target is an existing directory, the result will be to _____.
 - a) overwrite 'target' directory with 'source' directory
 - b) move 'source' directory to be a subdirectory of 'target' directory
 - c) move 'source' directory to be on same level in the directory tree as 'target' directory
 - d) merge 'target' directory with 'source' directory
- 4) Which of the following command used to change priority of the process?
 - a) nice
 - b) chpriority
 - c) renice
 - d) Not allowed to change process priority
- 5) Which of the following is the main Apache configuration file?
 - a) /etc/apache.conf
 - b) /etc/httpd/config
 - c) /etc/httpd/conf/httpd.conf
 - d) /etc/srm.conf
- 6) Suppose currently I am in /home/linux/Downloads/abc. After executing `cd ../../`, where am I now?
 - a) /home/linux
 - b) /home/linux/Downloads
 - c) /home
 - d) None of these
- 7) Which command used to print the route packets trace to a network host?
 - a) netstat
 - b) route
 - c) routetrace
 - d) none of these
- 8) _____ command is used to see the content of tar (backup.tar) file without extracting it.
 - a) tar -xvf backup.tar
 - b) tar -svf backup.tar
 - c) tar -tvf backup.tar
 - d) None of these

- 9) The information present in the Inode consists of _____.
 - a) owner and group owner of the file
 - b) Number of links to the file
 - c) Number of characters in a file
 - d) All of these
- 10) What does mean by octal permission 641?
 - a) Owner can read and write; group can write; other can read
 - b) Owner can read and write; group can read; other can execute
 - c) Owner can read and write; group can write and execute; other can read
 - d) Owner can read, write and execute; group can read and write; other can read

B) Fill in the blanks.

06

- 1) _____ system variable is used to return status of last command.
- 2) _____ character used to redirect the input.
- 3) _____ command to put a job back in the foreground.
- 4) "*" Wild character is used for matching _____ character.
- 5) In Vi editor, _____ option is used move to the end of a line.
- 6) _____ file responsible for storing basic information about user like UID, GUI, login shell etc.?

Q.2 Solve any eight of the following:

16

- a) What is hard links?
- b) How do you terminate an ongoing process?
- c) What is the purpose of groups?
- d) What are the types of shell?
- e) List the functions of kernel.
- f) Define Data Block.
- g) How to partition the drives?
- h) How will you forcibly remove a file?
- i) Differentiate between Home and Root Directory.
- j) List out the communication commands.

Q.3 A) Attempt any two of the following:

10

- 1) What are use of echo and read statement? Explain.
- 2) Explain different boot loaders.
- 3) How to translate characters? Explain command in details.

B) Write a menu driven shell Script.

06

- 1) To change the ownership of a "Student.txt" file
- 2) To add data at end of a "Student.txt" file
- 3) To kill a process of process id is 975
- 4) List all files and directory in reverse order from current directory

Q.4 A) Attempt any two of the following:

08

- 1) Explain Security Enhanced Linux.
- 2) What is shell Script? Explain Conditional Statements in shell programs.
- 3) Write a shell script to count number of lines present in a text file.

B) How to search a file and directory? What are the selection criteria's used for locating files in Linux.

08

Q.5 Attempt any two of the following.

- a) Define vi Editor and explain its modes.
- b) What is grep? How it is useful?
- c) What is ftp? How files can be transferred between two systems? Explain.

Seat No.	
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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
MS-EXCEL (Special Paper - XI) (19201533)

Day & Date: Monday, 15-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log tables and calculator is allowed.

Q.1 A) Choose the correct alternative. 10

- 1) _____ returns the least common multiple.
 - a) LCCM ()
 - b) LCM ()
 - c) TLCM ()
 - d) RTLCM ()
- 2) Which of the following identifies a cell in Excel?
 - a) Address
 - b) Formula
 - c) Name
 - d) Label
- 3) Which term is used to join the selected cells in one cell?
 - a) Filter
 - b) Wrap
 - c) Pivot
 - d) Merge
- 4) A formula in Excel always begins with an _____.
 - a) Equal sign
 - b) Colon
 - c) Comma
 - d) Space
- 5) The result is a _____ value either TRUE or FALSE.
 - a) Logical
 - b) Arithmetic
 - c) Algorithm
 - d) Logarithm
- 6) Press _____ to bring up search box.
 - a) Shift + F3
 - b) Shift + F4
 - c) Shift + F5
 - d) None of these
- 7) Workbook is a collection of _____.
 - a) Worksheets
 - b) Page set-up
 - c) Buttons
 - d) Diagrams
- 8) _____ is the intersection of a row with a column.
 - a) Cell
 - b) Row
 - c) Column
 - d) All of these
- 9) To displays the Find and Replace dialog box, with the Find tab selected press _____.
 - a) Alt + F
 - b) Tab + F
 - c) Esc + F
 - d) ctrl + F
- 10) In _____ tab you will find AutoSum button.
 - a) Formatting tab
 - b) Formulas tab
 - c) Standard tab
 - d) Clipboard tab

- B) Fill in the blanks.** **06**
- 1) Press _____ to save the active file with its current file name, location, and file format.
 - 2) _____ are equations that perform calculations on values in your worksheet.
 - 3) _____ function is used to add the values in the function argument.
 - 4) Press _____ to undo in MS-EXCEL.
 - 5) _____ of the worksheet appears vertically and are identified by letters at the top of the worksheet window.
 - 6) Press _____ to select all rows and columns in the worksheet.

- Q.2 Solve any Eight of the following:** **16**
- a) Write different charts in MS-Excel.
 - b) Explain what is a spreadsheet?
 - c) Which function is used to generate random numbers?
 - d) Write the function for calculating p. m. f. of binomial distribution with $n=10$ and $p=0.8$.
 - e) Which function is used to calculate mean of numbers?
 - f) Which function is used to calculate sum of numbers?
 - g) Which function is used to find maximum of numbers?
 - h) Write the name of file formats that are used to save a MS-EXCEL file.
 - i) How can you add cells, rows or columns in Excel?
 - j) What is the use of the IF function in Excel?

- Q.3 A) Attempt any Two of the following:** **10**
- 1) Explain MS Excel in brief.
 - 2) How do you find averages in MS- excel?
 - 3) How will you write the formula for the following?
- Multiply the value in cell A1 by 20, add 10 in the result, and divide it by 4.
- B) What is the difference between formulas and functions in Excel?** **06**

- Q.4 A) Attempt any Two of the following:** **08**
- 1) What is the order of operations used when evaluating formulas in Excel?
 - 2) How do you create Pivot Tables?
 - 3) How can you draw a 20 random numbers from 0 to 1?
- B) Explain different charts in MS-Excel.** **08**

- Q.5 Attempt any two of the following.** **16**
- a) Explain the SUM and SUMIF functions with examples.
 - b) What are the different types of COUNTIF functions in Excel?
 - c) Explain RAND and RANDBETWEEN functions with examples.

- Q.2 Write answers in short. (Any Four)** **12**
- a) Why did Robert Quick felt sad after returning from the business trip?
 - b) What are the things of beauty mentioned in the poem 'Ode to beauty'?
 - c) How does Charlotte Bronte describe the life in the poem 'Life'?
 - d) Describe the personality & the Dutchess in the poem 'My Last Dutchess'?
 - e) Which town does Aksionov belong to and to which fair did he visit to?
 - f) What happened to the children after listening to the story Sita narrated by their mother?
- Q.3 Answer any one of the following questions.** **10**
- a) How can technology literacy skills help learners in the future?
 - b) What are the best characteristics of a good Leader.
- Q.4 Mention eight habits which show that you are conscious of the environment and understand the need to conserve it.** **10**

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
PHYSICS (Paper - XIV)
Electrodynamics (19201619)

Day & Date: Thursday, 18-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks
 4) Use of log tables and calculator is allowed.

Q.1 A) Choose correct alternatives from the options. 10

- 1) The trajectory of a particle in mutually perpendicular crossed electric and magnetic field is _____.
 a) straight line parallel to \vec{E} b) parabola
 c) circle d) cycloid
- 2) Electric field intensity \vec{E} in terms of scalar potential ϕ is given by _____.
 a) $\vec{E} = -\nabla\phi$ b) $\vec{E} = \frac{1}{\nabla\phi}$
 c) $\vec{E} = \nabla\phi$ d) $\vec{E} = \phi$
- 3) According to Lenz's law, the induced e.m.f. _____ the rate of change of magnetic flux
 a) does not opposes b) opposes
 c) increases d) decreases
- 4) The electric displacement vector in dielectric medium is _____.
 a) $(\epsilon_0\vec{E} - \vec{P})$ b) $\epsilon_0\vec{E}$
 c) $(\epsilon_0\vec{E} + \vec{P})$ d) $(\epsilon_0\vec{E} + 2\vec{P})$
- 5) The wave impedance of free space is _____.
 a) 0Ω b) 376.6Ω
 c) 37.66Ω d) 3776Ω
- 6) In electromagnetic wave, the phase difference between electric and magnetic field vectors \vec{E} and \vec{B} in vacuum is _____.
 a) 0 b) $\frac{\pi}{2}$
 c) π d) $\frac{\pi}{4}$
- 7) Momentum density (\vec{G}) and Poynting's vector (\vec{N}) are related to each other in a medium characterized by μ and ϵ as _____.
 a) $\vec{G} = \vec{N}/\mu\epsilon$ b) $\vec{G} = \mu\epsilon\vec{N}$
 c) $\vec{G} = \sqrt{\mu\epsilon}\vec{N}$ d) $\vec{G} = \vec{N}\epsilon/\mu$
- 8) If there are free charges on the interface of two dielectrics then normal component of electric displacement vector at the interface is _____.
 a) continuous b) discontinuous
 c) zero d) always continuous

Q.5 Attempt any two of the following.

- a) Show that a charged particle moves along a circular path with a constant speed in a uniform magnetic field(\vec{B}).
- b) Establish the law of conservation of energy for electromagnetic field and explain the meaning of Poynting's vector.
- c) What is radiation reaction? Deduce an expression for radiation reaction force for an electric dipole.

Seat No.	
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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper - XIII)
Physical Chemistry (19201610)**

Day & Date: Thursday, 18-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks
4) Use of log tables and calculator is allowed.

Q.1 A) Choose the correct alternatives from the options. 10

- 1) The completely miscible solution can be separated by _____.
a) steam distillation b) evaporation
c) simple distillation d) fractional distillation
- 2) For vibrational overtone transitions, the selection rule is _____.
a) $\Delta v = \pm 1$ b) $\Delta v = 0, \pm 1$
c) $\Delta v = 0$ d) $\Delta v = \pm 1, \pm 2, \pm 3, \dots$
- 3) If the rate expression for the reaction is $dx/dt = kA^{1/2} B^{3/2}$, then the net order of the reaction is _____.
a) 0 b) 1
c) 2 d) 3
- 4) The unit of k for the third order reaction is _____.
a) $s^{-1}dm^6mol^{-2}$ b) $s^{-1}dm^3mol^{-2}$
c) $s^{-1}dm^3mol^{-1}$ d) $s^{-1}dm^{-3}mol^{-1}$
- 5) The selection rule for pure rotational transitions is _____.
a) $\Delta J = \pm 1$ b) $\Delta J = 0, \pm 1$
c) $\Delta J = 0$ d) $\Delta J = 0, \pm 1, \pm 2$
- 6) At equilibrium, ΔG and ΔS are _____.
a) positive b) negative
c) zero d) all of these
- 7) For third order reaction, half-life time $t_{1/2} =$ _____.
a) $3/2a^2k$ b) $0.693/k$
c) $1/ak$ d) 0
- 8) The composition of phenol in phenol-water system at CST is _____.
a) 10% b) 50%
c) 34% d) 100%
- 9) Which of the following reaction belongs to complex reactions?
a) parallel reactions b) consecutive reactions
c) reversible reactions d) all of these
- 10) The relationship which describes variation of vapour pressure with temperature is expressed by _____ equation.
a) Kirchoff's b) Van't Hoff's isochore
c) Gibbs-Helmholtz d) Clausius-Clapeyron

- B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product.** **06**
- 1) What is Rayleigh line in Raman spectrum?
 - 2) The force constant 'k' is expressed as _____.
 - 3) Define 'molality'.
 - 4) At what condition $\Delta A = \Delta G$?
 - 5) Write the mathematical expression for Helmholtz free energy.
 - 6) Write Arrhenius equation.
- Q.2 Solve any eight of the following:** **16**
- a) Mention different steps involved in a chain reaction.
 - b) Give the expression for Gibbs- Helmholtz equation.
 - c) State Raoult's law.
 - d) What is fractional distillation?
 - e) Calculate the frequency of a radiation having wavelength 3800Å.
 - f) Estimate the reduced mass of CO molecule
($m_C = 12$ amu and $m_O = 15.995$ amu)
 - g) What is hot band?
 - h) Give the half life time expression for third order reaction.
 - i) What are stokes and anti-stokes lines?
 - j) Give an example for opposing reaction in which first order opposed by first order reaction.
- Q.3 A) Attempt any two of the following:** **10**
- 1) What is Gibbs' free energy? Give physical significance of it.
 - 2) Explain diagrammatically various vibrational overtone transitions.
 - 3) Derive the expression for rate constant of a third order reaction with equal initial concentrations of the reactants.
- B) Short note/Solve.** **06**
- The rotational spectrum of $^1\text{H}^{35}\text{Cl}$ molecules shows that the rotational lines are equally separated by 20.70 cm^{-1} . Calculate the internuclear bond length. (Atomic masses are $^1\text{H} = 1.67 \times 10^{-27}\text{ Kg}$ $^{35}\text{Cl} = 5.88 \times 10^{-26}\text{ Kg}$)
- Q.4 A) Attempt any two of the following:** **08**
- 1) Determine the value of energy of activation. Given the following values for rate constant k at the temperature indicated
At 600 K; $k = 2.75 \times 10^{-8}\text{ L mol}^{-1}\text{ s}^{-1}$
At 800 K; $k = 1.95 \times 10^{-7}\text{ L mol}^{-1}\text{ s}^{-1}$
 - 2) Diagrammatically explain vapor pressure composition and boiling point composition curves of completely miscible binary solutions.
 - 3) Derive the expression for rotational energy of a diatomic molecule.
- B) Describe/Explain/Solve.** **08**
- Derive thermodynamically the law of mass action.
- Q.5 Attempt any two of the following.** **16**
- a) What are azeotropic mixtures? Discuss the distillation of solutions with the systems having boiling point minimum.
 - b) Derive an expression for Van't Hoff's isotherm.
 - c) What is polarizability? Give classical and quantum mechanical approach of Raman spectra.

- B) Fill in the blanks** **06**
- 1) Tikka disease is caused by _____.
 - 2) Sulfur based fungicides are used for _____ type of disease.
 - 3) An organisms that is capable of living only as a parasite _____ obligate parasite.
 - 4) The ability of a pathogen to cause plants disease is _____.
 - 5) Little leaf of brinjal is caused by _____.
 - 6) The mode of nutrition in fungi is _____.

- Q.2 Solve any Eight of the following:** **16**
- a) What is host range?
 - b) What are seed borne pathogens?
 - c) What are symptoms of grain smut of Jowar?
 - d) What is sterilization?
 - e) Give any two differences between rust and smut disease?
 - f) What is difference between primary host and secondary host?
 - g) What is seed certification?
 - h) What is plant pathogen?
 - i) What are facultative parasites?
 - j) What is infection?

- Q.3 A) Attempt any two of the following:** **10**
- 1) Describe the causal organism and symptoms of Oily spot of pomegranate.
 - 2) Describe the causal organism and control measures of Downy mildew of grapes.
 - 3) Describe the seed treatment methods
- B) Describe the scope and importance of Aerobiology.** **06**

- Q.4 A) Attempt any two of the following:** **08**
- 1) Describe classification of plant diseases based on symptoms.
 - 2) Describe symptoms, causal organism and control measures of white rust of mustard.
 - 3) Describe the causal organism, symptoms and control measures of Red rot of sugarcane.
- B) Describe causal organism, symptoms and control measures of Little leaf of brinjal.** **08**

- Q.5 Attempt any two of the following.** **16**
- a) Classify the plant diseases based on severity of infection and spread of disease.
 - b) Describe the causal organism symptoms and control measures late blight of potato.
 - c) Describe the causal organism, symptoms and control measures of tomato mosaic disease.

- B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**
- 1) _____ is used to measure Blood pressure.
 - 2) Define: Excretion.
 - 3) What is gastric digestion?
 - 4) Name the pigment present in blood.
 - 5) Name the Instrument used to treat the patients with acute renal failure.
 - 6) What is the end product of protein digestion.

Q.2 Solve any Eight of the following: 16

- a) What is Peristalsis?
- b) What is Tidal Volume?
- c) What are enzymes? Name any 2 gastric enzymes.
- d) What is micturation?
- e) Name the hormones which regulate kidney functions.
- f) Name 2 bile salts.
- g) Give the different types WBC in blood.
- h) Write the function of liver.
- i) What is Tachycardia?
- j) Name 2 hormones of pancreas.

Q.3 A) Attempt any two of the following: 10

- 1) Describe origin and conduction of heart beat.
- 2) Mechanical digestion of food
- 3) Structure of Nephron

B) Short note/Solve. 06

Describe functions of blood.

Q.4 A) Attempt any two of the following: 08

- 1) Describe cardiac cycle.
- 2) Bhor's effect
- 3) Functions of pancreas

B) Describe/Explain/Solve 08

Explain Yoga and stress.

Q.5 Attempt any two of the following. 16

- a) Describe the process of blood clotting.
- b) Explain the process of transport of carbon dioxide in blood.
- c) Describe the process of urine formation.

- B) Fill in the blanks.** 06
- 1) In R the diameter of the set $\{0,1,2, \dots, 100\}$ is _____.
 - 2) The real valued function f is continuous at $a \in R'$ if _____.
 - 3) If A and B are compact subset of R , then $A \times B$ is _____.
 - 4) Any finite subset of a metric space M is _____.
 - 5) The interval $[0, \frac{1}{2})$ is _____ subset of R' .
 - 6) If $f: A \rightarrow R'$ and f attains a maximum value at $a \in A$ then $f'(a) \equiv$ _____.

Q.2 Solve any Eight of the following: 16

- a) Show that the sequence $\left\{\frac{1}{\sqrt{n}}\right\}_1^\infty$ is not an element of l^2 .
- b) If $|x - 2| < 1$, prove that $|x^2 - 4| < 5$.
- c) Define the term homeomorphism.
- d) Define the term $\epsilon - \delta$ dense
- e) Show that the metric space $[0,1]$ with absolute value metric is compact.
- f) State the Heine-Borel property.
- g) Prove that the empty set in any metric space is open set.
- h) Prove that every subset of R_d is open.
- i) Prove that the interval $[a, b]$ is neither open nor closed.
- j) Let $T: R^2 \rightarrow R^2$ be a function defined by $f(x) = \frac{1}{2}x$. Prove that T is a contraction.

Q.3 A) Attempt any two of the following: 10

- 1) Prove that a subset E of l^2 is bounded and hence find its diameter.
- 2) Prove that in any metric space, every open ball is open set.
- 3) Show that the metric space $\langle M, \rho \rangle$ is compact if and only if every sequence of points in M has a subsequence converging to a point in M .

- B)** If f is a continuous function from the compact metric space M_1 into the metric space M_2 . Then show that the range $f(M_1)$ of f is compact. 06

Q.4 A) Attempt any two of the following: 08

- 1) Show that a continuous function of a continuous function is continuous.
- 2) If F_1 and F_2 are closed subset of a metric space M , then show that $F_1 \cup F_2$ is closed.
- 3) Show that in any metric space, every convergent sequence is Cauchy.

- B)** Show that l^2 is complete. 08

Q.5 Attempt any two of the following. 16

- a)** Fix $n \in I$. If $x = \langle x_1, \dots, x_n \rangle$ and $y = \langle y_1, \dots, y_n \rangle$ are two ordered n - tuples of real numbers, define

$$\rho(x, y) = \left[\sum_{k=1}^n (x_k - y_k)^2 \right]^{1/2} \quad \text{Then prove that } \langle R^n, \rho \rangle \text{ is a metric space.}$$

- b)** In a metric space $\langle M, \rho \rangle$, show that the subset A of M is totally bounded if and only if every sequence of points of A contains a Cauchy subsequence.
- c)** Show that f is continuous if and only if the inverse image of every open set is open.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper - XIII)
Statistical Inference - II (19201643)

Day & Date: Thursday, 18-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log tables and calculator is allowed.

Q.1 A) Choose correct alternatives from the option. 10

- 1) Most frequently used method of breaking the ties is _____.
 - a) midrank method
 - b) average statistics approach
 - c) to omit tied values
 - d) most favorable statistic approach
- 2) The decision criteria in SPRT depends on the functions of _____.
 - a) type I error
 - b) type II error
 - c) type I error and type II error
 - d) none of the two types of errors.
- 3) Degrees of freedom is related to _____.
 - a) no. of observations in a set
 - b) hypothesis under test
 - c) no. of independent observations in a set
 - d) None of the above
- 4) Which of the following is correct if $P(5.25 \leq \Theta \leq 20.25) = 0.99$?
 - a) 5.25 and 20.25 are 99% confidence limit.
 - b) The length of the confidence interval is 15.
 - c) Both a) and b)
 - d) None of These
- 5) Neyman - Pearson lemma provides _____.

a) Unbiased C. R.	b) Most powerful C. R.
c) Admissible C. R.	d) Minimal C. R.
- 6) Which of the following is applicable to paired data _____.
 - a) The Sign test
 - b) The Median test
 - c) Wilcoxon's signed rank test
 - d) Both a) & c)
- 7) A sequence of symbols shows lack of randomness if there are _____.

a) Too many runs	b) Too few runs
c) Both a) and b)	d) Neither a) nor b)

- 8) Area of critical region is depends on _____.
 a) size of type I error b) size of type II error
 c) value of the statistic d) number of observations
- 9) Test of $H_0: \mu = 40$ against $H_1: \mu > 40$ leads to _____.
 a) left tailed test b) right tailed test
 c) two tailed test d) none of these
- 10) A test which is at least as powerful as any other test of the same size is known as _____.
 a) M. P. test b) U. M. P. test
 c) L. R. test d) none of these

B) Define the following. 06

- 1) Pivotal quantity
- 2) Level of significance
- 3) Type-2 error
- 4) Confidence Interval
- 5) Run
- 6) Power of test

Q.2 Explain the following terms. (Any Eight) 16

- a) Null and Alternative hypothesis
- b) Critical regions
- c) ASN function
- d) Size of test
- e) One sided confidence interval.
- f) State confidence interval for μ when σ^2 is unknown in case of $N(\mu, \sigma^2)$ distribution.
- g) State confidence interval for population variance σ^2 when μ is known.
- h) Simple and composite hypothesis.
- i) State confidence interval for population proportion P.

Q.3 A) Attempt any two of the following: 10

- 1) A coin is for which the probability of occurrence of head is P, thrown 7 times and null hypothesis is $H_0: P = \frac{1}{2}$ tested against $H_1: P = \frac{1}{4}$ is accepted more than one head appears, then compute
 i) size of test ii) power of test
- 2) Obtain $100(1 - \alpha)\%$ confidence interval for the parameter μ in case of $N(\mu, \sigma^2)$ distribution, when σ^2 is known.
- 3) Describe the procedure of Sign test.

B) Explain the procedure of Mann-Whitney U test for two samples. 06

Q.4 A) Attempt any two of the following: 08

- 1) Derive the likelihood ratio test for testing $H_0: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ when a sample of size n is taken from $N(\mu, \sigma^2)$
- 2) Obtain $100(1 - \alpha)\%$ confidence interval for ratio of two population variances in case of normal distribution.
- 3) Describe the procedure of Wilcoxon Signed-Rank test.

B) Let X be a Bernoulli variate with p.m.f 08

$P(x, \Theta) = \Theta^x (1 - \Theta)^{1-x}; x = 0, 1, 0 \leq x \leq 1$
 Construct SPRT test for testing $H_0: \Theta = \Theta_0$ against $H_1: \Theta = \Theta_1$

Q.5 Attempt any two of the following.

- a) State and prove Neyman- Pearson lemma.
- b) Obtain SPRT for testing $H_0: \lambda = \lambda_0$ against $H_1: \lambda = \lambda_1$ where λ is the parameter of poisson distribution, find appropriate expressions for OC function and ASN function.
- c) State the procedure of Wald-Wolfowitz Run test for two independent samples.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Special Paper - XIII)
Photogeology & Remote Sensing (19201652)

Day & Date: Thursday, 18-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Choose correct alternatives from the options. 10

- 1) What is the percentage of forward overlap in stereo pair?
 - a) 20
 - b) 30
 - c) 50
 - d) 60
- 2) A point on the ground directly in line axis of the aerial photograph is _____.
 - a) Kadir
 - b) Nadir
 - c) Natial
 - d) None of these
- 3) Sandstones show _____ tone in the aerial photograph.
 - a) black
 - b) dark
 - c) intermediate
 - d) light
- 4) Amphibolites and gabbros show _____ tone in the aerial photograph.
 - a) black
 - b) dark
 - c) intermediate
 - d) light
- 5) Raster data is a type _____ data.
 - a) numerical
 - b) non-spatial
 - c) spatial
 - d) Vector
- 6) Vector data is a type of _____ data.
 - a) numerical
 - b) non-spatial
 - c) spatial
 - d) raster
- 7) Basic elements of vector data are _____.
 - a) point
 - b) line
 - c) polygon
 - d) All of these
- 8) In vector format bedding plane is represented by _____.
 - a) point
 - b) line
 - c) polygon
 - d) All of these
- 9) Outcrop of shale in vector format can be represented by _____.
 - a) point
 - b) line
 - c) polygon
 - d) All of these
- 10) Which one of the following data is represented in grid form?
 - a) point
 - b) line
 - c) polygon
 - d) raster

- B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**
- 1) What is Photogrammetry?
 - 2) What is Photointerpretation?
 - 3) What is the use of fiducial marks?
 - 4) What is side overlap percentage for stereo pair?
 - 5) What is lineament?
 - 6) Define Geographic information System.

- Q.2 Solve any Eight of the following: 16**
- a) What are specular and diffused reflections?
 - b) What is panchromatic black and white photograph?
 - c) Advantages of vector data model.
 - d) Disadvantages of vector data model.
 - e) Advantages of raster data structure.
 - f) Disadvantages of raster data structure.
 - g) How to number and mark the specimen collected in the field?
 - h) Explain two types of base maps.
 - i) What is strike and dip?
 - j) What is passive and active remote sensing?

- Q.3 A) Attempt any two of the following: 10**
- 1) What is difference between vector and raster data structure? Specify what geological applications are used in each data structure.
 - 2) Distinguish planimetric maps from topographic maps and briefly outline their specific uses.
 - 3) How to map lithological contact in the field?
- B) Short note/Solve. 06**
Describe various drainage patterns, Draw sketches.

- Q.4 A) Attempt any two of the following: 08**
- 1) Explain types of resolutions.
 - 2) What is radiance?
 - 3) Describe types of aerial photographs depending on optical axis position.
- B) Describe/Explain/Solve. 08**
Describe in detail texture and pattern of aerial photographs.

- Q.5 Attempt any two of the following. 16**
- a) What are atmospheric windows?
 - b) Explain spectral reflectance curve.
 - c) Describe in detail tone of aerial photographs.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Special Paper - XIII)
Microbial Genetics (19201660)

Day & Date: Thursday, 18-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks
 4) Use of log tables and calculator is allowed.

Q.1 A) Choose correct alternatives from the options. 10

- 1) In DNA fingerprinting technique _____ used as marker.
 - a) RAPD
 - b) VNTR
 - c) AFLP
 - d) RFLP
- 2) _____ is a nucleotide sequence database.
 - a) SWISSPROT
 - b) EMBL
 - c) PROSITE
 - d) TREMBL
- 3) _____ is a structural gene in Lac operon of *E. coli* encodes β galactosidase enzyme.
 - a) Lac A
 - b) Lac Y
 - c) Lac I
 - d) Lac Z
- 4) In replication unwinding of DNA is carried out _____ enzyme.
 - a) Primase
 - b) Topoisomerase
 - c) DNA polymerase
 - d) Helicase
- 5) The enzymatic nucleotide DNA sequencing also known as _____ method.
 - a) Sanger
 - b) Automated
 - c) Maxam-Gilbert
 - d) Edman
- 6) _____ type of gel electrophoresis most commonly used for separation of large fragments of DNA.
 - a) PAGE
 - b) SDS-PAGE
 - c) Agarose
 - d) 2D PAGE
- 7) A point mutation which includes addition or deletion of nucleotide in the m-RNA known is as _____ mutation.
 - a) Frame shift
 - b) Non sense
 - c) Missense
 - d) Translocation
- 8) Eco RI _____ type of restriction enzyme most commonly used in r-DNA technology.
 - a) Type I
 - b) Type II
 - c) Type III
 - d) Type IV
- 9) The long chain of adenine is added at the nascent chain of RNA in the 3' end during poly-adenylation by the enzyme _____.
 - a) Poly A polymerase
 - b) Taq polymerase
 - c) RNA polymerase
 - d) DNA polymerase

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Special Paper - XIII)
Power Electronics (19201676)

Day & Date: Thursday, 18-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks
 4) Use of log tables and calculator is allowed.

Q.1 A) Choose the correct alternatives from the options. 10

- 1) SIT is a _____ charge carrier device.
 - a) majority
 - b) minority
 - c) both majority and minority
 - d) All of these
- 2) In SCR the magnitude of holding current is always _____ the latching current.
 - a) less than
 - b) greater than
 - c) equal to
 - d) all of these
- 3) If gate current of the SCR is increased then the magnitude of the forward break-over voltage is _____.
 - a) increased
 - b) remains as it
 - c) does not depend on gate current
 - d) Decreased
- 4) In SCR based parallel inverter _____ type of commutation is used.
 - a) Class A
 - b) Class C
 - c) Class B
 - d) Class F
- 5) UPS means _____.
 - a) Uninterrupted Power SCR
 - b) Unijunction Power Supply
 - c) Uninterrupted Power Supply
 - d) Under Performance SCR
- 6) The buried gate is fabricated in _____ device.
 - a) GTO
 - b) SCR
 - c) PUT
 - d) SIT
- 7) Power BJT is a _____ layer semiconductor power controlling device.
 - a) one
 - b) two
 - c) four
 - d) three
- 8) _____ is programmable in PUT.
 - a) Gate voltage
 - b) Load current
 - c) Anode voltage
 - d) Cathode voltage

Seat No.	
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Set **P**

B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper - XIV)
Web Technology (19201668)

Day & Date: Thursday, 18-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

- Q.1 A) Choose the correct alternatives from the option. 10**
- 1) Which term is used for pages that depend on the Master page?
 - a) Content Pages
 - b) Master Pages
 - c) Web Pages
 - d) None of the above
 - 2) Which file contains the Application_Start event?
 - a) Global.asax
 - b) Web.config
 - c) Local.asax
 - d) None
 - 3) What is the return type of IsPostBack property?
 - a) Integer
 - b) Boolean
 - c) Float
 - d) All
 - 4) Which is/are the component(s) of ADO.NET?
 - a) Dataset
 - b) Data Reader
 - c) Command and Connection
 - d) All of the above
 - 5) Which control is required for every page that have AJAX Extensions.
 - a) UpdatePanel
 - b) ScriptManager
 - c) ContentPanel
 - d) None of the above
 - 6) ASP.NET validation controls works (handle validation) at _____.
 - a) Client side only
 - b) Server side only
 - c) Both client side and server side
 - d) None of the above
 - 7) The _____ is responsible for allocating, freeing, and compacting memory.
 - a) garbage collector
 - b) type checker
 - c) code manager
 - d) memory Manager
 - 8) _____ property of radio button must be set to achieve single selection from group of radio buttons.
 - a) GroupName
 - b) TextMode
 - c) Checked
 - d) SingleGroup
 - 9) How many types of authentication ASP.NET supports?
 - a) Windows Authentication
 - b) .NET Passport Authentication
 - c) Forms Authentication
 - d) All of the above

- 10) Which data provider gives the maximum performance when connect to SQL Server?
- The Oracle data provider
 - The SqlClient data provider
 - The OLE DB data provider
 - All of the above

B) Fill in the blank. 06

- Extension of Master page is _____.
- HTTP stands for _____.
- _____ method will send you to a new page, update the address bar and add it to the Browser History.
- The _____ control enables you to perform postbacks at a specified interval in AJAX.
- _____ cache stores a copy of the finally rendered HTML pages or part of pages sent to the client.
- _____ can be used to store information that needs to be submitted along with the web page, but should not be displayed on the page.

Q.2 Solve any Eight of the following: 16

- List out components of .Net Framework.
- What is Validation?
- How to create Cookies?
- What is Data Cache?
- What are the event ordering of master page?
- What are the different site navigation control in ASP.Net?
- What is AJAX?
- What is authentication?
- What is AutoPost back?
- What is page directive?

Q.3 A) Attempt any two of the following: 10

- Explain page life cycle phases.
- Explain Timer Control in AJAX with example.
- Explain Global.asax.

B) What is session? How to store and retrieve value from session? 06

Q.4 A) Attempt any two of the following: 08

- Differentiate client side validation and server side validation.
- Design a xml file for student
- Explain need of master page.

B) Explain App_Code application folder. Use app_code for class library having method for checking number is ODD, EVEN, PRIME. 08

Q.5 Attempt any two of the following. 16

- How to store student information into database using stored procedure
- Design a web page having a SiteMapPath control in ASP.NET.
- What is ADO.Net? Explain components of ADO.Net

Q.5 Attempt any two of the following questions.

16

- a) Discuss various techniques of characterization of nanostructured materials.
- b) Explain classification of materials in detail.
- c) Explain particle reinforced composites and fiber reinforced composites.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper - XIV)
Inorganic Chemistry (19201611)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagrams wherever necessary.
 4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. 10

- 1) _____ is the following lanthanide ion which is diamagnetic.

a) yb^{2+}	b) tu^{3+}
c) Oy^{3+}	d) Hd^{2+}
- 2) Observed electronic configuration of Gadolinium is _____.

a) $[\text{xc}]4f^7 5d^0 6s^2$	b) $[\text{xc}]4f^7 5d^1 6s^2$
c) $[\text{xc}]4f^8 5d^1 6s^2$	d) $[\text{xc}]4f^7 5d^1 6s^1$
- 3) Most of the lanthanides are separated from one another by _____ methods.

a) Bulk separation	b) Fractional prescription
c) Complex formation	d) ion Exchange
- 4) Superconductor show _____ effect.

a) Resonance	b) Raman
c) Trans	d) Meissner
- 5) A Semiconductor has _____ valence electrons.

a) 3	b) 4
c) 1	d) 2
- 6) In structure of diborane distance between two boron atom is _____ pm.

a) 166	b) 177
c) 133	d) 144
- 7) In so_2 oxidation state of Sulphur is _____.

a) 3	b) 2
c) 1	d) 4
- 8) Effect of oxygen on corrosion is explained by _____.

a) Faraday's rule	b) Whiteney Principle
c) Evan's rule	d) Keir Principle

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
BOTANY (Special Paper – XIV)
Plant Biotechnology (19201602)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagrams wherever necessary.
 4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. 10

- 1) Recombinant DNA Technology is the process of joining _____ different DNA molecules.
 - a) one
 - b) two
 - c) three
 - d) four
- 2) _____ fingerprinting is a technique that shows the genetic makeup of living things.
 - a) DNA
 - b) RNA
 - c) both a and b
 - d) None of these
- 3) Reporter gene is an _____ coding region joined to a promoter region.
 - a) endogenous
 - b) exogenous
 - c) both a and b
 - d) None of these
- 4) Transgenic plants have been constructed that express _____.
 - a) proteins
 - b) lipid
 - c) fat
 - d) All of these
- 5) _____ can take up foreign DNA in a process called transformation.
 - a) Bacteria
 - b) Virus
 - c) Fungus
 - d) Mycoplasma
- 6) PCR cloning is a _____ method for cloning genes.
 - a) slow
 - b) rapid
 - c) both a and b
 - d) None of these
- 7) _____ is another term for tissue culture.
 - a) Micropropagation
 - b) Macropropagation
 - c) both a and b
 - d) None of these
- 8) Somatic hybridization involves the following aspects _____.
 - a) Fusion of protoplasts
 - b) Selection of hybrid cells
 - c) Identification of hybrid plants
 - d) all of these
- 9) Biotechnology provides important tools for the sustainable development of _____.
 - a) agriculture
 - b) fisheries
 - c) forestry
 - d) All of these

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Special Paper – XIV)
Evolutionary Biology (19201628)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat labelled diagrams wherever necessary.
 4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. 10

- 1) On the Origin of Species was written by _____.
 a) Charles Babbage b) de Vries
 c) Charles Darwin d) Lamarck
- 2) The earliest geological time period among the following is _____.
 a) Cambrian b) Jurassic
 c) Quaternary d) Permian
- 3) Observation of species on _____ island heavily inspired Darwin's theory of evolution.
 a) Andaman b) Nicobar
 c) Galapagos d) Fiero
- 4) _____ was considered as a missing link between annelids and arthropods.
 a) Seymouria b) Archeopteryx
 c) Lobe fish d) Peripatus
- 5) The force that initiates evolution is _____.
 a) Variation b) Mutation
 c) Extinction d) Adapatation
- 6) During evolution, the first cellular form of life appeared before how many million years?
 a) 2000 b) 3000
 c) 4000 d) 5000
- 7) The study of fossils is _____.
 a) Fossology b) Paleontology
 c) Geology d) Zoogeology
- 8) The modern man is _____.
 a) Cromagnon man b) Homo neanderthalensis
 c) Lemuroidea d) Dromaeosaurus
- 9) Darwin's theory of natural selection was based on _____.
 a) Inheritance of acquired characters
 b) Mutation
 c) Enormous rate of reproduction in organisms, struggle for existence and survival of the fittest.
 d) Changes due to the use and disuse of organ

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Special Paper - XIV)
Numerical Analysis (19201636)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose the correct alternatives from the options. 10

- 1) The solution of the equation $u_{n+3} - 3u_{n+1} + 2u_n = 0$ is _____.
 a) $u_n = c_1(-2)^n + (c_2 + c_3n)(1)^n$
 b) $u_n = c_1(2)^n + (c_2 + c_3n)(1)^n$
 c) $u_n = c_1(-2)^n + (c_2n + c_3n^2)(1)^n$
 d) $u_n = c_1(-2)^n + (c_2 + c_3n^2)(1)^n$
- 2) The order of difference equation $y_{n+2} - 2y_n + y_{n-1} = 1$ is _____.
 a) 2
 b) 1
 c) 0
 d) 3
- 3) The P.I. of equation $y_{n+2} - 5y_{n+1} - 6y_n = 4^n$ is _____.
 a) $P.I. = -\frac{1}{16}4^n$
 b) $P.I. = \frac{1}{16}4^n$
 c) $P.I. = -\frac{1}{10}4^n$
 d) $P.I. = \frac{1}{10}4^n$
- 4) If the interval of differencing is unity then
 $\Delta^4[(1-x)(1-2x)(1-3x)] =$ _____.
 a) 36
 b) -36
 c) $-6x^3$
 d) Zero
- 5) If $(E^{1/2} + E^{-1/2})(1 + \Delta)^{1/2} =$ _____.
 a) $\Delta + 1$
 b) $\Delta - 1$
 c) $\Delta + 2$
 d) $\Delta - 2$
- 6) If $(1 + \Delta)(1 - \nabla) =$ _____.
 a) 1
 b) $1 - \Delta\nabla$
 c) $\Delta - \nabla$
 d) -1
- 7) The exact value of $\int_0^6 \frac{dx}{1+x^2} =$ _____.
 a) 4.4056
 b) 3.4056
 c) 2.4056
 d) 1.4056

h) Find forward difference table for the following values

X:	3	4	5	6	7	8	9
Y:	4.8	8.4	14.5	23.6	36.2	52.8	73.9

i) Prove that $\mu = \frac{1}{2}(E^{1/2} + E^{-1/2})$

j) Evaluate $\Delta^2 \left(\frac{5x+12}{x^2+5x+6} \right)$

Q.3 A) Attempt any two of the following. 10

1) Prove that $\nabla y_{n+1} = h(1 + \frac{1}{2}\nabla + \frac{5}{12}\nabla^2 + \dots) y'_n$

2) Using Newton's forward formula, find the value of $f(1.6)$ if

x:	1	1.4	1.8	2.2
f(x):	3.49	4.82	5.96	6.5

3) Solve $y_{n+2} - 4y_n = n^2 + n - 1$

B) State and prove Lagrange's interpolation formula. 06

Q.4 A) Attempt any two of the followings. 08

1) Solve $y_{p+3} - 3y_{p+2} + 3y_{p+1} - y_p = 1$

2) Use the Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2} dx$,
taking the number 10 interval.

3) Find the cubic polynomial which takes the following values.

x:	0	1	2	3
f(x):	1	2	1	10

B) State and prove Simpson's $(\frac{3}{8})^{th}$ rule and hence solve 08

$$\int_0^1 \frac{dx}{1+x}, \quad h = 0.25$$

Q.5 Attempt any two of the followings. 16

a) State and prove Newtons forward interpolation formula.

b) State and prove Simpson's $(\frac{1}{3})^{rd}$ rule and hence solve $\int_0^6 \frac{dx}{1+x^2}, h = 1$

c) Prove that

1) $\Delta = \frac{1}{2}\delta^2 + \delta\sqrt{1 + \frac{\delta^2}{4}}$

2) $1 + \delta^2 u^2 = \left(1 + \frac{1}{2}\delta^2\right)^2$

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper - XIV)
Probability Theory (19201644)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose the correct alternatives from the options. 10

- 1) Which one of the following is an order statistic?
 - a) sample mode
 - b) sample median
 - c) sample mean
 - d) none of these
- 2) If Y_5 is the fifth order statistic of a random sample X_1, X_2, \dots, X_{10} ; $0 < X_i < 5$ then range of Y_5 is _____.
 - a) $0 < y_5 < 1$
 - b) $0 < y_5 < 10$
 - c) $-10 < y_5 < 1$
 - d) $0 < y_5 < 5$
- 3) W.L.L.N. does not hold good for the sequence $\{X_n\}$ of i.i.d r.v.
 - a) Cauchy
 - b) Chi-Square
 - c) Normal
 - d) Exponential
- 4) The most famous example of convergence in distribution to standard normal distribution is _____.
 - a) WLLN
 - b) CLT
 - c) convergence in probability
 - d) none of these
- 5) If $X_n \xrightarrow{P} X$ then
 - a) $X_n^2 \xrightarrow{P} X$
 - b) $X_n^2 \xrightarrow{L} X^2$
 - c) $X_n^2 \xrightarrow{2} X^2$
 - d) $X_n^2 \xrightarrow{P} X^2$
- 6) If state 3 is absorbing state then $P_{32} =$ _____.
 - a) 1
 - b) 0
 - c) less than 1
 - d) 0.5
- 7) Markov property is based on _____.
 - a) unconditional probability
 - b) expectation
 - c) conditional probability
 - d) none of these

- 8) Consider the following statements regarding Transition Probability Matrix (TPM)
- (A) For TPM row sum must be 1
 (B) For TPM column sum must be 1
- a) only (A) is true b) only (B) is true
 c) Both (A) and (B) are true d) Neither (A) nor (B) are true
- 9) In $M/M/1 : \infty / FIFO$ model the distribution of arrivals is _____.
 a) Poisson b) Geometric
 c) Uniform d) Exponential
- 10) In usual notations expected waiting time in the system is given by _____.
 a) $W_s = (\lambda - \mu)$ b) $W_s = (\lambda - \mu)^{-1}$
 c) $W_s = (\mu - \lambda)$ d) $W_s = (\mu - \lambda)^{-1}$

Q.1 B) Fill in the blank 06

- 1) The probability density function of the largest order statistic $X_{(n)}$ is ____.
- 2) Let X_1, X_2, \dots, X_n be i.i.d $U(0,1)$ variates and $X_{(n) max} = (X_1, X_2, \dots, X_n)$. Then $E[X_{(n)}] =$ _____.
- 3) If $X_n \xrightarrow{P} x$, then $(X_n - X) \xrightarrow{P}$ _____.
- 4) Non recurrent state is also called as _____.
- 5) In $M/M/1 : \infty / FIFO$ model, distribution of inter arrival time is _____.
- 6) In usual notations, if $\lambda = 5$ per hour and $\mu = 4$ per hour then in $M/M/1 : \infty / FIFO$ model, traffic intensity will be _____.

Q.2 Solve any Eight of the following 16

- a) In usual notations state the p.d.f. of r^{th} order statistic.
- b) Let $X_{(1)}, X_{(2)}, X_{(3)}, X_{(4)}$ be the order statistic of a random sample of size 4 drawn from the distribution having p.d.f.
- $$f(x) = \begin{cases} e^{-x} & 0, < x < \infty \\ 0 & , o. w \end{cases}$$
- Find p.d.f. of n^{th} order statistic.
- c) State the distribution sample median (when sample n is odd)
- d) Define convergence in quadratic mean.
- e) Let $X_1, X_2, X_3, \dots, X_n$, be a random sample from a $\chi^2_{(10)}$ distribution. Test whether WLLN holds good.
- f) Define Irreducible Markov.
- g) Give one example of continuous state and continuous time of stochastic process.
- h) Define first return probabilities of TPM.
- i) State any two assumptions made while deriving probability distribution in queuing system.
- j) Write on service mechanism in queuing theory.

Q.3 A) Solve any two of the following **10**

- 1) If X_1, X_2, X_3, X_4 , be the i.i.d random variable having common distribution function
 $f(x) = 1 - e^{-3x}, x \geq 0$
 Find the expected value of first order statistic
- 2) State and prove the WLLN for i.i.d. random variables.
- 3) Suppose that if it rains today then it will rain tomorrow with probability α and if it does not rain today then it will rain tomorrow with probability β . Then find TPM and draw transition diagram.

B) One customer arrives at a counter in a bank after every 15 minutes. **06**

Staff on the counter takes 10 minutes on an average for serving a customer. Under the assumptions for applying $M/M/1 : \infty/FCFS$ model, find:-

- 1) Average queue length
- 2) Expected waiting time in the queue

Q.4 A) Solve any two of the following **08**

- 1) Let $\{X_n\}$ be a sequence of random variables defined by
 $P(X_n = 0) = 1 - \frac{1}{n}, P(X_n = 1) = \frac{1}{n}$ show that $X_n \xrightarrow{P} \frac{1}{n}$
- 2) Let $\{X_n, n \geq 1\}^n$ be a Markov chain with 3 states 1, 2, 3 with one step TPM

$$P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$$
 and initial distribution and initial probability distribution $P(X_0 = 1) = 0.7, P(X_0 = 2) = 0.2, P(X_0 = 3) = 0.1$ Find
 i) $P_{13}^{(2)}$
 ii) $P(X_2 = 3)$
- 3) For queuing model $M/M/1 : (\infty/FCFS)$ with usual notation, find expression for average number of customers in the system.

B) If $X_n \xrightarrow{p} X$ and $Y_n \xrightarrow{p} Y$ as $n \rightarrow \infty$ than show that $X_n + Y_n \xrightarrow{p} X + Y$ as $n \rightarrow \infty$ **08**

also show that $X_n - Y_n \xrightarrow{p} X - Y$ as $n \rightarrow \infty$

Q.5 Answer the following (Any Two). **16**

- a) Order Stat Show that the distribution of sample median of a random sample of size $(2n + 1)$ from $U(0,1)$ follows beta distribution of first kind
- b) For a Markov chain $\{X_n, n \geq 1\}$ one step TPM is as follows.

$$P = \begin{bmatrix} 0 & 1 & 0 \\ p & 0 & q \\ 0 & 1 & 0 \end{bmatrix}$$
 check whether states are recurrent or not.

- c) Customer arrives at a box office window being served by a single person according to Poisson input process with a mean rate of 60 per hour. The time required to serve a customer has an exponential distribution with of 40 seconds. Determine.
- 1) utilization rate of this system
 - 2) average length of queue
 - 3) average length of non-empty queue
 - 4) mean waiting time of an arrival

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Special Paper – XIV)
Geomorphology and Geotectonics (19201653)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions.

10

- 1) Which of the following is associated with a divergent plate boundary?
 - a) Ridge
 - b) Trench
 - c) Island arc
 - d) Accretionary prism
- 2) The removal of particles of dust and sand by strong winds is called _____.
 - a) Abrasion
 - b) Depletion
 - c) Deflation
 - d) Accretion
- 3) _____ erosion is a fluvial process of erosion that lengthens a stream, a valley or a gully at its head.
 - a) Headward
 - b) Valley deepening
 - c) Valley widening
 - d) None of these
- 4) Karst topography is related with _____ terrain.
 - a) sandstone
 - b) shale
 - c) conglomerate
 - d) limestone
- 5) What do scientists believe is the force behind the plate tectonics theory?
 - a) convection currents
 - b) the Sun's gravity
 - c) gravity slab pull
 - d) the movement of the planets
- 6) What is the lithosphere?
 - a) large, flat stones sitting on top of malleable magma
 - b) the plates that make up the crust and the upper part of the mantle
 - c) the plates that make up the crust
 - d) the upper part of the mantle
- 7) Which of the following are not water-laid deposits associated with glaciers?
 - a) Moraines
 - b) Kames
 - c) Eskers
 - d) Varves
- 8) Compressive stresses, reverse faulting, granitic magmas, and intermediate depth earthquakes are associated with _____.
 - a) subduction zones
 - b) spreading centers
 - c) continent/continent convergence
 - d) Transform boundaries

- 9) Volcanic island arcs are associated with _____.
 a) transform plate boundaries
 b) divergent plate boundaries
 c) ocean-ocean convergent plate boundaries
 d) ocean-continent convergent plate boundaries.
- 10) Exfoliation domes are common in _____ terrain.
 a) inclined sedimentary beds b) horizontal lava flows of beds
 c) massive granitic rocks d) metamorphic rocks

B) Fill in the blanks:**06**

- 1) Alluvial fans and alluvial cones, meanders and ox-bow lakes and natural levees are characteristics of _____ stage in the fluvial evolution.
 a) youth b) mature
 c) old d) all of the above
- 2) Large pieces of the lithosphere that float on the asthenosphere are called:
 a) Asthenosphere b) the mid-oceanic ridge
 c) deep-sea trenches d) tectonic plates
- 3) The variously shaped depressions of different dimensions that are developed in the riverbed are called _____.
 a) Potholes b) Cavities
 c) Dents d) Craters
- 4) The elevated land between two basins is known as _____.
 a) point bars b) spits
 c) subtracts d) drainage divide
- 5) _____ is the type of plate boundary of the Indian plate along the Himalayan mountains?
 a) Ocean – continent convergence
 b) Ocean – continent divergent boundary
 c) Ocean – ocean transform boundary
 d) Continent – continent convergence
- 6) _____ is the study of the record of the Earth's magnetic field in rocks or sediments.
 a) Paleoenvironment b) Paleoclimate
 c) Paleolithology d) paleomagnetism

Q.2 Solve any Eight of the following.**16**

- a) What is principle of Uniformitarianism?
 b) Name the endogenous processes.
 c) Define asthenosphere.
 d) Describe valley width in old stage.
 e) Name the types of plate boundaries.
 f) Give any two erosional features of wind.
 g) What is polycyclic landscape?
 h) Name the depositional feature of karst topography.
 i) List the geological features related to convergent plate boundary.
 j) Name the any two types of drainage pattern.

- Q.3 A) Attempt any Two of the following. 10**
- 1) What are characters of youth stage in cycle of erosion?
 - 2) Explain geological structures and mass movement relationship.
 - 3) Describe Paleomagnetism and its application.
- B) Discuss the types of convergent plate boundaries with suitable diagram. 06**
- Q.4 A) Attempt any Two of the following. 08**
- 1) Write short note on Sea floor spreading.
 - 2) Explain the brief the karst topography and its features.
 - 3) Describe any three relations between landform and structures.
- B) Define orogeny. Describe in short the formation of Himalaya. 08**
- Q.5 Attempt any Two of the following. 16**
- a) Explain in detail the three stages of river with its suitable features.
 - b) Discuss the static and eustatic rejuvenation.
 - c) Describe in brief the magmatism and seismic activity related to plate boundaries.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
Electronics (Special Paper – XIV)
Embedded System Design (19201677)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice question**08**

- 1) IC _____ is used as line driver in stepper motor interfacing with 8051 microcontroller.
 - a) 7447
 - b) BT136
 - c) MCT2E
 - d) UL2003
- 2) The 16×2 smart LCD display have _____ registers.
 - a) one
 - b) two
 - c) three
 - d) four
- 3) The % sign is _____ type of operator in embedded C programming.
 - a) Logical
 - b) Relational
 - c) Arithmetic
 - d) Bit wise
- 4) In embedded C programming, the group of similar quantities is called as _____.
 - a) Constant
 - b) Array
 - c) Variable
 - d) Keyword
- 5) To interface the relay with 8051 freewheeling diode is connected across _____.
 - a) switch
 - b) collector-emitter junction of transistor
 - c) relay
 - d) ground
- 6) The Keil micro vision is an Integrated Development Environment (IDE) for _____ microcontroller based embedded system.
 - a) 89C51
 - b) 89C52
 - c) 89V51RD2
 - d) All of these
- 7) Which _____ statement is used for superloop in microcontroller programming using embedded C.
 - a) while (0)
 - b) while (1)
 - c) while (10)
 - d) while (100)
- 8) The embedded C language the Keywords are also known as _____.
 - a) Constants
 - b) Reserved words
 - c) Variables
 - d) Integers
- 9) The range of signed character data type is from _____.
 - a) -128 to +127
 - b) 0 to 255
 - c) 0 to 65535
 - d) -32768 to +32767

- 10) An embedded system consists of minimum a _____ device.
- a) computing
 - b) input
 - c) output
 - d) I/O

B) Answer the following. 06

- 1) How many total keyword are available in embedded C.
- 2) Define the embedded system.
- 3) Is for(;;) loop is used as superloop in embedded C programming?
- 4) On execution of the statement $X = Y/Z$, where $Y = 10$, $Z = 3$, what is the value returned to X, if X variable is integer type?
- 5) To display the BCD data on LCD, which code of the character should be send to LCD?
- 6) State the name of header file necessary to include in embedded C program for 8051.

Q.2 Solve any Eight of the following. 16

- a) State characteristics of an embedded system.
- b) Define constants and variables of the C Language.
- c) State applications of an embedded system.
- d) Give the syntax of while loop statement.
- e) What is the meaning of void function in embedded C.
- f) Mention data types of the C language.
- g) Give the logical operations in C language.
- h) Give structure of embedded C program.
- i) State the control signals of 16×2 LCD.
- j) State format specifier for integer and character.

Q.3 A) Attempt any Two of the following. 10

- 1) Write Embedded C program for blinking the LED of Port 0.
- 2) Why the need of operating system? Write a note on superloop.
- 3) Describe interfacing of Relay to microcontroller 8951.

B) What is if control statement? Describe in detail if control statement in detail with suitable example. 06

Q.4 A) Attempt any Two of the following. 08

- 1) What is loop? Discuss while loop with suitable example.
- 2) Write embedded C program for generation of square of at port Port 1.
- 3) Discuss the development of an embedded system for controlling of DC motor.

B) With suitable diagram describe an interfacing of ADC 0804 to microcontroller 8951. 08

Q.5 Attempt any Two of the following. 16

- a) Describe in detail the designing of an embedded system for temperature measurement system.
- b) What is operators in C programme? Explain any three operators with suitable program.
- c) Describe interfacing of 16×2 LCD to 8951 microcontroller.

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper – XV)
Advanced Java (19201669)

Day & Date: Wednesday, 24-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose the correct options.

10

- 1) Which of the following is true about servlet containers?
 - a) They are used to compile servlets into bytecode
 - b) They are responsible for managing the lifecycle of servlets
 - c) They are part of the Java Development Kit (JDK)
 - d) They are used for storing servlet-related data
- 2) "out" is implicit object of which class?
 - a) javax.servlet.jsp.PrintWriter
 - b) javax.servlet.jsp.SessionWriter
 - c) javax.servlet.jsp.SessionPrinter
 - d) javax.servlet.jsp.JspWriter
- 3) How many layers are available in Hibernate architecture?
 - a) 3
 - b) 4
 - c) 5
 - d) 2
- 4) Struts combines which of these in to a unified Framework?
 - a) Java Servlets
 - b) Java Server pages
 - c) Custom tags and Message Resources
 - d) All mentioned above
- 5) Hibernate is an?
 - a) Open Source
 - b) Lightweight
 - c) ORM
 - d) All mentioned above
- 6) Which of the following is used to rollback a JDBC transaction?
 - a) rollback()
 - b) rollforward()
 - c) deleteTransaction()
 - d) RemoveTransaction()
- 7) Which pattern is the struts framework based?
 - a) MVC2 Pattern
 - b) Bridge Pattern
 - c) MVC 1 Pattern
 - d) None of the above
- 8) Which attribute is used to specify initialization method?
 - a) init
 - b) init-method
 - c) initialization
 - d) initialization-method
- 9) What is the default scope of JSP variables?
 - a) Request scope
 - b) Session scope
 - c) Application scope
 - d) Page scop

- 10) What is the purpose of the ServletContext object?
- a) To hold client session information
 - b) To process client requests
 - c) To manage the lifecycle of servlet instances
 - d) To provide a shared context for servlets within a web application

B) Fill in the blanks. 06

- 1) A valueStack is a simply stack that contains application specific object is _____.
- 2) _____ attribute is used to specify class name of the bean?
- 3) _____ tag is used to iterate over a collection or array of objects?
- 4) _____ file database table configuration is stored?
- 5) Parameterized queries can be executed by _____
- 6) The _____ object provides access to the initialization parameters configured for a servlet.

Q.2 Solve any Eight of the following. 16

- a) What is CGI?
- b) What is javabean?
- c) What is JSP?
- d) What is custom tag in JSP?
- e) Use of cookies.
- f) Use of struts.
- g) What is Hibernate?
- h) Use of Drivers.
- i) Use of setProperty.
- j) Use of include() and forward() method.

Q.3 A) Attempt any Two of the following. 10

- 1) Explain Steps to create application of Hibernate.
- 2) Write a program for preparad statement.
- 3) Explain advantages and disadvantages of JSP.

B) Difference between Servlet & CGI. 06

Q.4 A) Attempt any Two of the following. 08

- 1) Explain JSTL core tags.
- 2) Explain use of URL Rewritten.
- 3) Write a program for execute() & execute Query()method in JDBC.

B) Explain steps to create application of struts. 08

Q.5 Attempt any Two of the following. 16

- a) What is JDBC? Explain it's features.
- b) What is servlet? Explain servlet life cycle.
- c) Explain request & response implicit object in jsp with example.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
PHYSICS (Paper - XVI)

Atomic, Molecular Physics and Quantum Mechanics (19201621)

Day & Date: Thursday, 25-04-2024

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labeled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Select the correct alternative from the following: 10

- 1) Most intense line in doublet corresponds to _____.
 a) Maximum j value b) j and ℓ change in same way
 c) Both a and b together d) zero j value
- 2) Elements with configuration ns^1 for last orbit are called _____.
 a) alkali metals b) alkaline earth metals
 c) halogen d) inert gases
- 3) When the atom is placed in external weak magnetic field, then we observe _____.
 a) normal Zeeman effect b) anomalous Zeeman effect
 c) Paschen-back effect d) Stark effect
- 4) In Paschen-back effect, every energy level corresponding to a given ℓ value splits into _____ sub levels.
 a) 2ℓ b) $(2\ell + 1)$
 c) $2(2\ell + 1)$ d) $2(2\ell + 2)$
- 5) The reduced mass (μ) of rigid rotator is given by _____.
 a) $\frac{m_1+m_2}{m_1m_2}$ b) $\frac{m_1m_2}{m_1+m_2}$
 c) $\frac{m_1}{m_1+m_2}$ d) $\frac{m_2}{m_1+m_2}$
- 6) If wave function Ψ is imaginary then probability density is _____.
 a) negative b) positive
 c) a positive real quantity d) a negative real quantity
- 7) Reduced Plank's constant is _____.
 a) $h/2\pi$ b) h/π
 c) $h\pi$ d) $2\pi h$
- 8) The minimum energy of particle confined to one dimensional rigid box is obtained by substituting n equal to _____.
 a) one b) zero
 c) half d) two

- Q.4 A) Attempt any Two of the following.** **08**
- 1) State and express Ladder operator.
 - 2) Derive the component of orbital angular momentum L_x .
 - 3) State all quantum numbers.
- B) Using the steady state Schrodinger's wave equation, derive the energy eigen values for the motion of particle in three dimensional rigid box.** **08**
- Q.5 Attempt any Two of the following.** **16**
- a) Explain anomalous Zeeman effect and obtain an expression for term shift.
 - b) Solve Schrodinger's equation for hydrogen atom and discuss the radial wave equation.
 - c) Obtain Zero point energy in case of linear harmonic oscillator.

- Q.4 A) Answer the followings (Any Two):** **08**
- 1) What are heterocyclic compounds? Give the methods of synthesis of pyridine.
 - 2) Discuss the analytical evidences put forth in support of structure of Vitamin-A.
 - 3) Explain the Witt's theory for chromophore and auxochrome.
- B) Answer the following questions.** **08**
- 1) What happens when glucose is treated with,
 - i) Red P/HI
 - ii) Acetic anhydride
 - iii) Cone. HNO₃
 - iv) NH₂OH
 - 2) Give the synthesis and uses of Phenobarbitone.
- Q.5 Answer the following (Any Two).** **16**
- a) What are antibiotics? Explain Penicillin-G with respect to,
 - i) Structure
 - ii) Types
 - iii) Acidic hydrolysis
 - iv) Alkaline hydrolysis
 - b) Explain the different methods for the determination of ring size of D-glucose.
 - c) What is the action of following on quinolone?
 - i) Conc. HNO₃ + Conc. H₂SO₄
 - ii) SO₃ - H₂SO₄ / 220°C
 - iii) NaNH₂/Δ
 - iv) C₄H₉Li
 - v) C₆H₅Li
 - vi) Na in liquid NH₃
 - vii) H₂/Ni, 150°C, 160 atm.
 - viii) H₂ - Pt/CH₃COOH

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
BOTANY (Special Paper- XV)
Cell Biology (19201603)

Day & Date: Thursday, 25-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 A) Multiple Choice questions.

10

- 1) _____ is present inside the nucleus of eukaryotes.
 - a) Ribosomes
 - b) Cell membrane
 - c) Cytoplasm
 - d) Nucleolus
- 2) ATP is the energy currency of cell which is synthesized and stored in _____.
 - a) chloroplast
 - b) mitochondria
 - c) nucleus
 - d) nucleolus
- 3) In mitotic cell division, the chromosomes are present on equatorial plate in _____ phase.
 - a) prophase
 - b) metaphase
 - c) anaphase
 - d) telophase
- 4) The process of division of nucleus is called _____.
 - a) karyokinesis
 - b) cytokinesis
 - c) parthenogenesis
 - d) all of these
- 5) When the power of ocular lens is 10 X and objective is 45X, the magnification is _____ larger than original object.
 - a) 100 times
 - b) 200 times
 - c) 400 times
 - d) 450 times
- 6) In _____ division the chromosome number is reduced to half in daughter cells than the parental cells.
 - a) meiosis
 - b) mitosis
 - c) amitosis
 - d) all of these
- 7) Ultra structure of cell organelles can be studied by _____.
 - a) dissecting microscope
 - b) compound microscope
 - c) electron microscope
 - d) all of these
- 8) Eukaryotic cell differs from prokaryotic cell in having _____.
 - a) endoplasmic reticulum
 - b) ribosome
 - c) true nucleus
 - d) cytoplasm

- 9) An endogenously generated rhythms with a period close to 24 hours is _____.
 a) Circannual rhythm b) Circadian rhythm
 c) Diurnal rhythm d) Ultradian rhythm
- 10) Hormone melatonin, that induces sleep is produced by _____ endocrine gland.
 a) Pineal b) Pituitary
 c) Pancreas d) Parathyroid

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06

- 1) Cure or prevention of disease with proper regard to timing of administration of various types of therapeutics is _____.
- 2) Give the name of ethologist who studied the dance language in honey bees: _____.
- 3) Behavior which focuses on immediate cause of behavior is known as: _____.
- 4) Define the meaning of the term: Courtship.
- 5) Define the meaning of the term: Chronopharmacology.
- 6) Define the meaning of the term: Phototaxis.

Q.2 Solve any Eight of the following: 16

- a) Define meaning of 'Ultimate cause of behavior'.
 b) State the meaning of 'Biological Clock'
 c) Explain the term 'Altruism'
 d) Define the meaning of the term 'Amplitude' in biological oscillation.
 e) Explain the term 'Chronobiology'
 f) State the meaning of 'Photoperiod' with respect to seasonal reproduction in vertebrates.
 g) Define the term 'Chronomedicine'.
 h) State the term 'Society' with respect to social behavior
 i) Explain the term 'Sexual Dimorphism'.
 j) Define the term 'Geotaxis' with suitable example.

Q.3 A) Attempt any two of the following: 10

- 1) Discuss difference between instinctive and learned behaviors with suitable examples.
 2) Explain imprinting behavior and its significance with suitable examples.
 3) Define mate choice and add a note on intra-sexual and intersexual selection with suitable examples.

B) Short note/Solve. 06

Give a short account on classical conditioning experiment of Ivan Pavlov on dog with suitable illustration.

Q.4 A) Attempt any two of the following: 08

- 1) Discuss significance of chronobiology in chronopharmacology, chronomedicine, chronotherapy and drug design.
 2) Give a short note on adaptive significance of biological clock to animals.
 3) Discuss 'Habituation Behavior' and its advantages to animals with suitable examples.

B) Describe/Explain/Solve 08

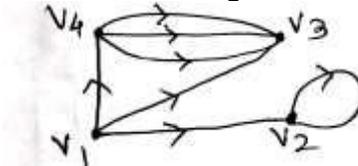
Give a detailed account on the ethological contributions of Konrad Lorenz and Niko Tinbergen and Karl von Frisch.

Q.5 Attempt any two of the following.

- a)** Give a detailed account on foraging and dance language in honey bees with suitable illustrations.
- b)** Give an account on types and characteristics of biological rhythms.
- c)** Give a detailed account on the contributions of Ivan Pavlov and Karl von Frisch in ethology.

- 3) Convert binary number $111 \cdot 1101_{(2)}$ to decimal and the decimal number $0.78125_{(10)}$ to binary number.

- B) Find indegree, out degree and Total degree of each vertex of graph. 06



- Q.4 A) Answer the followings (Any Two): 08

- 1) Show that a graph G is self complementary if it has $4n$ or $4n + 1$ vertices.
(n is non negative integer)
- 2) Write short note on polish prefix and postfix notation
- 3) Draw the graph whose incidence matrix is

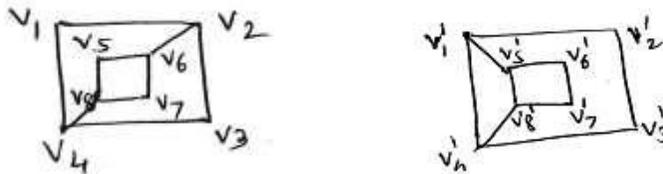
	e_1	e_2	e_3	e_4	e_5	e_6
v_1	0	1	0	0	1	1
v_2	1	0	1	0	0	0
v_3	1	0	0	0	0	1
v_4	0	1	1	1	1	0
v_5	0	0	0	1	0	0

- B) Convert 08

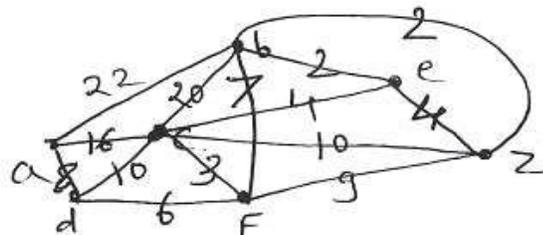
- 1) $0.4375_{(10)}$ to Octal
- 2) $27.A3C_{(16)}$ to Binary
- 3) $11110101011001_{(2)}$ to hexadecimal
- 4) $71_{(8)}$ to decimal

- Q.5 Attempt any two of the following questions. 16

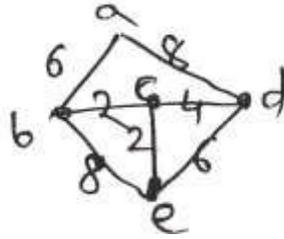
- a) Show that following graph are not isomorphic



- b) Using Dijkstra's algorithm find shortest path from a to z



c) By using Kruskal's algorithm find minimal spanning tree



- 8) A factorial experiment with three factors at two levels is called _____.
 a) 2×3 factorial experiment
 b) 3×2 factorial experiment
 c) 3^2 factorial experiment
 d) 2^3 factorial experiment
- 9) If same factorial effect is confounded in all the replicates, then it is called _____.
 a) Total confounding
 b) Incomplete confounding
 c) Partial confounding
 d) no confounding
- 10) In factorial experiment the effect totals are obtained by _____.
 a) Kendall
 b) Yate's
 c) Karl Pearson
 d) None of these

B) Attempt all of the following: 06

- 1) Define experimental unit.
- 2) Define Local control.
- 3) Explain the term Treatment.
- 4) State the formula to find M.S.S.
- 5) State mathematical model of C.R.D.
- 6) What is full form of ANOCOVA?

Q.2 Answer the following. (Any Eight) 16

- a) Give situation where missing plot technique is applicable.
- b) Define main effects in 2^2 factorial experiment.
- c) Explain interaction effects in 2^2 factorial experiment.
- d) Give real life situations where CRD is used.
- e) Define layout of an experiment.
- f) State the headings of columns of ANOVA Table.
- g) Define block and yield.
- h) Define efficiency of design of experiment.
- i) Describe the principle of replication.
- j) Define the principle of Randomization.

Q.3 A) Attempt any Two of the following. 10

- 1) What is RBD? Give its layout.
- 2) Estimate the parameters in CRD.
- 3) Explain total and partial confounding.

B) Give layout of Latin Square Design. 06

Q.4 A) Attempt any Two of the following. 08

- 1) Derive the formula for one missing observation in R.B.D.
- 2) Explain Yate's procedure to obtain factorial effect totals in 2^2 factorial experiment.
- 3) Find interaction effect in 2^3 factorial experiment.

B) Explain the procedure of testing of equality of two treatments means in LSD. 08

Q.5 Attempt any Two of the following.

- a) Following data are available for a 5×5 LSD, Row S.S.= 22, Column S.S.= 26 Treatment S.S.= 16, Error S.S.= 18
Prepare and complete ANOVA Table.
- b) Explain the concept of ANOCOVA. Give the mathematical model and ANOCOVA table in CRD.
- c) Derive the formula for missing observation in LSD.

Seat
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Special Paper-XV)
Environmental Geology (19201654)

Day & Date: Thursday, 25-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions.**10**

- 1) What disaster did India experience on 15th June 2023?
 - a) Cyclone
 - b) Landslide
 - c) Avalanche
 - d) subsidence
- 2) Commonly, who is the head of the National Disaster Management team?
 - a) Finance Minister
 - b) Chief Minister
 - c) District Collector
 - d) Prime Minister
- 3) What is frequently experienced by Assam?
 - a) Cyclone
 - b) flood
 - c) Avalanche
 - d) subsidence
- 4) Overexploitation of underground water & minerals illegally may cause which disaster?
 - a) Cyclone
 - b) Tsunami
 - c) sea level rise
 - d) Subsidence
- 5) Industrialization is one of the major reasons for which effect?
 - a) Cyclone
 - b) flood
 - c) Global Warming
 - d) Subsidence
- 6) What is the effect of the removal of green cover in the catchment that may further lead to flooding?
 - a) siltation in the dam
 - b) Tsunami
 - c) Global Warming
 - d) Subsidence
- 7) What is the effect of increase in Greenhouse gasses?
 - a) siltation in the dam
 - b) Tsunami
 - c) Global Warming
 - d) Subsidence
- 8) What is the meaning for the object, situation of, process that has potential to cause damage?
 - a) Hazard
 - b) Disaster
 - c) Mitigation
 - d) Insecure
- 9) What may slope modification lead to?
 - a) Landslide
 - b) Tsunami
 - c) Global Warming
 - d) Subsidence

- 10) What is the main objective of studying environmental geology?
- protecting life and its environment
 - protecting life
 - sustainable development
 - improving life quality

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06

- Define environmental geology.
- Define abutment.
- What happens when water vapor diffuses in clouds?
- Water droplets after condensation fall down is called as?
- What term is used to describe precipitation in the Upper Himalayan region?
- What long lasting impact the Tsunami will cause on the coastal soils?

Q.2 Solve any Eight of the following. 16

- What was the name and type of the disaster that hit the west coast of India recently?
- What are the names of the ocean currents that adversely impact global precipitation?
- What is a tropical environment like?
- What are two supportive natural resources of the biosphere?
- What are the geographic locations of the solid state of the hydrosphere?
- Which is the most important lithospheric content that supports plants & why?
- Which most important content of the atmosphere is supportive to most of the animals? & Why?
- What impact on the atmosphere will be caused if the magnetic field of earth vanishes? Why?
- What are two major causes of subsidence?
- Give any two major causes of increased salinity of groundwater at the coastal areas?

Q.3 A) Attempt any Two of the following. 10

- Sketch & describe the energy budget
- Sketch and describe the Hydrogeological cycle.
- Sketch the idea of lithosphere & explain the processes and products required to it.

B) Explain the nature of geological report for preparedness of probable dam failure. 06

Q.4 A) Attempt any Two of the following. 08

- Describe the interaction between lithosphere and biosphere.
- Describe the interaction between biosphere and atmosphere.
- Explain the relation of landslides or related phenomenon & floods with famous examples.

B) Describe the interaction between lithosphere and atmosphere. 08

Q.5 Attempt any Two of the following. 16

- What is disaster management? Explain the preparedness phase of a flood disaster.
- Explain the mitigation and the post disaster phase of volcanic disaster.
- What is drought? Explain the causes and sustainable remedies for controlling the draughts.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Special Paper- XV)
Clinical Microbiology (19201662)

Day & Date: Thursday, 25-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw a neat labelled diagram wherever necessary.
 3) Figures to the right indicate full marks.

Q.1 A) Multiple choose questions.

10

- 1) _____ antibiotic has, a beta lactam ring.
 - a) Tetracyclin
 - b) Streptomycin
 - c) Penicillin
 - d) Cephalosporin
- 2) Tetanus toxin is of _____ Type.
 - a) Neurotoxin
 - b) Cytotoxin
 - c) Endotoxin
 - d) Enterotoxin
- 3) Germ tube test is used for the diagnosis of _____.
 - a) AIDS
 - b) Candidiasis
 - c) Syphilis
 - d) Typhoid fever
- 4) Organism showing swarming growth on culture media is _____.
 - a) Shigella
 - b) Klebsiella
 - c) Proteus
 - d) Escherichia
- 5) Selective medium for Vibrio cholera is _____.
 - a) Dettol agar
 - b) NIH
 - c) TCBS
 - d) Stuart
- 6) Single skin lesion is seen in _____ type of leprosy.
 - a) TT
 - b) LL
 - c) BT
 - d) BL
- 7) The genome of AIDS virus is _____.
 - a) ssDNA
 - b) ssRNA
 - c) dsDNA
 - d) negative sense
- 8) _____ is associated with food poisoning due to consumption of sea fish.
 - a) Vibrio vulnificus
 - b) Vibrio alginolyticus
 - c) Vibrio parahaemolyticus
 - d) Vibrio cholerae
- 9) Multiple antibiotic resistance is mediated by _____.
 - a) Plasmid
 - b) Episome
 - c) Col plasmid
 - d) All of these

- 10) Ringworm of the scalp is Known as _____.
- a) Tinea capitis
 - b) Onychomycosis
 - c) Tinea pedis
 - d) Tinea unguium

B) Answer in one or two words. 06

- 1) Define vaccine.
- 2) What is antifungal agent?
- 3) What is pathogenicity?
- 4) What is the mode of transmission of cholera?
- 5) What is oral thrush?
- 6) What are negri bodies?

Q.2 Answer the following. (Any Eight) 16

- a) What is acid fast staining?
- b) Enlist ideal characteristics of antibiotics.
- c) What is microbial adhesion?
- d) Enlist bacterial toxins.
- e) What is microbial invasion?
- f) What is antibiotic resistance.
- g) Give examples of antiprotozoal agents.
- h) How to dispose clinical samples.
- i) What is the role of fomites.
- j) Define CDC.

Q.3 A) Answer the following. (Any Two) 10

- 1) Write short note on Ebola disease.
- 2) Explain the pathogenicity, Spread and control of malaria.
- 3) Give the details of mechanism of pathogenicity of fungal infection.

B) Write an account on AIDS. 06

Q.4 A) Answer the following. (Any Two) 08

- 1) Write in detail about Rabies disease.
- 2) Write pathogenesis of herpes simplex infection.
- 3) Write an account on hospital acquired infection.

B) Give an detail account on biological warfare. 08

Q.5 Answer the following. (Any Two) 16

- a) How is the chemotherapy tested with special reference to diffusion and birth dilution Methods.
- b) Write an account on antibiotics acting on nucleic acid synthesis.
- c) Explain in detail new generation vaccine.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Special Paper - XV)
Electronics Instrumentation (19201678)

Day & Date: Thursday, 25-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log tables and calculators is allowed.

Q.1 A) Multiple choice questions. 10

- 1) Normally data acquisition system is _____ measurement system.
 - a) on-line
 - b) off-line
 - c) both (a) and (b)
 - d) can't say
- 2) In multichannel data acquisition system _____ unit is used to scan the conditioned outputs from different channels.
 - a) Buffer
 - b) Controller
 - c) A/D converter
 - d) Multiplexer
- 3) The instrumentation amplifiers are used principally to amplify signals from _____ of the following.
 - a) Active filters
 - b) Choppers
 - c) D/A converters
 - d) Transducers
- 4) To design bridge amplifier it requires _____.
 - a) differential amplifier
 - b) op-amp inverting
 - c) op-amp noninverting
 - d) None of these
- 5) As far as power consumption is concerned LCD display consume _____ power when compared to LED displays.
 - a) less
 - b) more
 - c) no power
 - d) same power
- 6) In electronic circuit in which dc signal is converted into an ac signal, amplified by standard amplifier and finally converted back to dc signal is called _____.
 - a) chopper
 - b) clamper
 - c) inverter
 - d) rectifier
- 7) In instrumentation amplifier, the output voltage is product of _____.
 - a) gain and difference of input signals
 - b) gain and ratio of input signal
 - c) difference and sum of input signals
 - d) all of these

- 8) The 4-20 mA current transmission is an example of _____ technique.
a) ratiometric conversion b) offset compensation
c) logarithmic conversion d) grounding
- 9) The AD594/595 is precalibrated precision amplifier to produce output voltage _____ from thermocouple signal.
a) 1 mV/°C b) 10 μ V/°C
c) 10 mV/°C d) 1 μ V/°C
- 10) Stress and strain curves are plotted using _____.
a) Strip chart recorder b) X-Y recording
c) X-T Recorder d) All of these

B) One sentence answer. 06

- 1) What is the use of Digital Multimeter?
- 2) What is the role of Isolation amplifiers?
- 3) What is need of Programmable instrumentation amplifier?
- 4) What is full form of DAS?
- 5) Which is most popular crystal structure in LCD display?
- 6) Which is the nature of liquid, if the pH of liquid is less than 7?

Q.2 Solve any Eight of the following. 16

- a) Compare dc and ac signal conditioning technique.
- b) Give Salient features of Programmable Instrumentation amplifiers.
- c) Draw pin configuration of the IC AD620.
- d) What is Data logger?
- e) Draw block diagram AC signal conditioning technique.
- f) Enlist the names of Display Unit.
- g) Draw block diagram of chopper amplifier.
- h) What is 4-20 mA current transmission?
- i) Draw Block Schematic of digital multimeter.
- j) Draw Block diagram of temperature meter.

Q.3 A) Attempt any Two of the following. 10

- 1) Write a note on X-Y meter.
- 2) Explain General block diagram for electronics instrument design for measurement.
- 3) Explain ratiometric conversion.

B) Write a note on Bridge Amplifier. 06

Q.4 A) Attempt any Two of the following. 08

- 1) Explain Instrumentation amplifier
- 2) Draw diagram and explain pH meter.
- 3) Write a note on Computer based Data Acquisition System.

B) Explain Digital storage oscilloscope. 08

Q.5 Attempt any Two of the following.

- a) Draw block Diagram & Explain LCR-Q meter.
- b) Describe general DAS with block diagram. And explain the multichannel DAS.
- c) Give Salient features, Draw & Explain Block diagram and Pin description of AD620.

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper- XVI)
Data Communication and Networking – II (19201670)

Day & Date: Thursday, 25-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose the correct alternatives from the options. 10

- 1) The elements of data communication are _____.
 - a) Sender
 - b) Receiver
 - c) Transmission medium
 - d) All of the above
- 2) _____ is the process of dividing a link, the physical medium, into logical channels for better efficiency.
 - a) Multiplexing
 - b) Switching
 - c) Protocol
 - d) Modulation
- 3) A device operating at the physical layer is called a _____.
 - a) Bridge
 - b) Router
 - c) Repeater
 - d) All of these
- 4) AM and FM are examples of _____ modulation.
 - a) Analog-to-analog
 - b) Analog-to-digital
 - c) Digital-to-digital
 - d) Digital-to-analog
- 5) _____ model is a model for understanding and designing network architecture.
 - a) TCP/IP
 - b) Open system interconnection
 - c) Network Model
 - d) None of these
- 6) _____ is a number of packets passing through the network in a unit of time
 - a) Switching
 - b) Modulation
 - c) Throughput
 - d) Multiplexing
- 7) Most packet switches use _____ principle.
 - a) Stop and wait
 - b) Store and forward
 - c) Stop and wait ARQ
 - d) None of the above
- 8) _____ is the transmission of data between two or more computer over communication Links.
 - a) Data communication
 - b) Data networking
 - c) Networking
 - d) Communication

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
PHYSICS (Paper – XVII)
Electronics (19201622)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 A) Select the correct alternative from the following.

10

- 1) An SCR has three terminals i.e., _____.
 a) anode, cathode, grid b) cathode, anode, gate
 c) anode, cathode, drain d) anode, cathode, source
- 2) The output of non-inverting op-amps is _____ with input.
 a) constant b) reverse
 c) in phase d) out of phase
- 3) The normal way to turn ON an SCR is by _____.
 a) appropriate gate current
 b) breakdown voltage
 c) appropriate anode current
 d) none of the above
- 4) MOSFET is sometime called _____ FET.
 a) shorted gates b) insulated gate
 c) many gates d) open gate
- 5) Output of timer is _____ of supply voltage.
 a) dependant b) corresponds
 c) constant d) independent
- 6) LED stands for _____.
 a) Light Emitting Diode b) Line Emitting Diode
 c) Length Emitting Diode d) Light Emitting Disk
- 7) A triac is equivalent to two SCR's _____.
 a) in parallel b) in series
 c) in-inverse-parallel d) none of the above
- 8) In LED, Gallium Arsenide material used for doping give _____ colour.
 a) yellow b) blue
 c) green d) red
- 9) IC 555 timer operates in _____ mode.
 a) single b) double
 c) three d) four
- 10) In gas discharge plasma displays, cold cathode numerical indicators are called _____.
 a) gate b) cathode
 c) nixies d) anode

B) Fill in the blank/Definition/ One sentence answer/One world answer/Give the name/Predict the product etc. 06

- 1) In IC 555 pin number six is _____.
- 2) An SCR is sometimes called _____.
- 3) Which MOSFET can be operated in depletion as well as enhancement mode?
- 4) The device that does not have gate terminal is a _____.
- 5) The turn ON-OFF time of LED's is less than _____.
- 6) The two inputs terminals of an op-amp are known as _____.

Q.2 Attempt any Eight of the following. 16

- a) Write the applications of DIAC.
- b) Define the terms: Breakdown voltage and Holding current.
- c) State any four characteristics of an ideal OP-AMP.
- d) What are the advantages of LED?
- e) Draw the pin connection diagram of IC-555 timer.
- f) Give the important features of LCD's.
- g) Draw the symbols of DIAC and TRIAC.
- h) What do you understand by Nixies?
- i) Define comparator.
- j) Sketch the I-V characteristics of SCR.

Q.3 A) Attempt any Two of the following. 10

- 1) Give comparison between D-MOSFET and E-MOSFET.
- 2) Explain op-amp as a differentiator.
- 3) Explain LCD.

B) In 555 astable multivibrator, $R_a = 22\text{ k}$, $R_b = 39\text{ k}$ and $C = 0.01\text{ }\mu\text{f}$. Calculate the T_{ON} and T_{OFF} . 06

Q.4 A) Attempt any Two of the following. 08

- 1) Draw the functional block diagram of IC 555 timer.
- 2) Draw the structure of LED and explain its operation in brief.
- 3) Explain op-amp as an integrator.

B) Write a not Schmitt trigger. 08

Q.5 Attempt any Two of the following. 16

- a) Explain construction, working and characteristics of DIAC.
- b) Derive an expression for voltage gain of non inverting amplifier using op-amp.
- c) Explain gas discharge plasma displays.

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper- XVI)
Analytical and Industrial Organic Chemistry (19201617)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 A) Select the correct alternative from the following. 10

- A linear polymer of 1,3 butadiene is formed when _____ polymerization takes place.
 - 1, 2
 - 1, 3
 - 1, 1
 - 1, 4
- Nitrogen is used as mobile phase in _____ chromatography.
 - Thin layer
 - Paper
 - Gas
 - Column
- Toilet soap can be represented by _____ general formula.
 - $(RCOO^-)_2Mg^{++}$
 - $(RCOO^-)_2Ca^{++}$
 - $RCOO^-K^+$
 - $RCOO^-Na^+$
- Semi-solid mass obtained at the end of crystallization process is called as _____.
 - sprit
 - melter
 - molasses
 - massecuite
- Compound imbibitions technique is used to _____ sugar cane juice.
 - concentrate
 - extract
 - decolorize
 - crystallize
- Cyclobutanone is converted into cyclobutanol by action of _____.
 - 1,3-dithiane
 - $NaBH_4$
 - SeO_2
 - OsO_4
- Lithium aluminium hydride ($LiAlH_4$) can used _____ reagent.
 - oxidizing
 - hydrating
 - reducing
 - hydrolyzing
- Acetaldehyde is converted into _____ by action of SeO_2 .
 - glyoxal
 - oxalic acid
 - ethyl alcohol
 - peopane
- In steam heater cane juice is heated to _____ K.
 - 333
 - 328
 - 273
 - 373
- Natural rubber is polymer of _____.
 - styrene
 - isoprene
 - ethane
 - butadiene

- B) Fill in the blank.** **06**
- 1) Heating of raw rubber in presence of sulfur and white lead at moderate temperature is known as _____.
 - 2) The ratio of distance moved by solute to that by solvent front is known as _____ value.
 - 3) Soap when vigorously shaken in water forms aggregate structure called as _____.
 - 4) The polymer which softens on heating and hardens on cooling is called as _____.
 - 5) Thermal conductivity cell is used as detector in _____ chromatography.
 - 6) Monomer used in manufacture of neoprene is _____.
- Q.2 Solve any Eight of the following.** **16**
- a) Write the reactions for preparation of teepol.
 - b) Mention any two advantages of soaps over detergents.
 - c) Mention the types of polymers based on origin and composition.
 - d) Write synthesis and uses of PVC.
 - e) Define the terms absolute alcohol and power alcohol.
 - f) Mention the By-products of alcohol industry.
 - g) Write any four characteristics of bio-catalytic reactions.
 - h) Write any two synthetic applications of Sodium borohydride with reactions.
 - i) Write the principle of Thin layer chromatography.
 - j) Mention different types of mobile phases used for Gas and Thin layer chromatography.
- Q.3 A) Attempt any Two of the following.** **10**
- 1) Write a note on Ziegler-Natta polymerization, mention types of polymers based on tacticity.
 - 2) Write a note on By-products of sugar industry.
 - 3) Write a note on different raw materials used in soap industry.
- B) Short note/Solve.** **06**
- Discus manufacture of soap by hot or semi-boiled process.
- Q.4 A) Attempt any Two of the following.** **08**
- 1) Explain any four applications of SeO_2 as an oxidizing agent.
 - 2) What are PTC? Give their brief account as catalysts.
 - 3) Write the steps involved in synthesis of phenol formaldehyde resin and mention its uses.
- B) Describe/Explain/Solve.** **08**
- Explain paper chromatography with reference to principle, methodology and applications.
- Q.5 Attempt any Two of the following.** **16**
- a) Give brief account of manufacture of ethyl alcohol from molasses.
 - b) Give brief account of construction and working of Gas chromatography.
 - c) Explain concept of Umpolung with reference to use of 1,3-dithiane and give its applications. Write a note on types of ionic liquids with example.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
BOTANY (Special Paper – XVI)
Nursery, Gardening & Horticulture (19201608)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 A) Select the correct alternative from the following. 10

- 1) Nursery is defined as an area where _____ are raised for eventual planting.
 - a) plants
 - b) animals
 - c) both a and b
 - d) None of these
- 2) Objectives of Nursery occupies an important place in _____ regeneration.
 - a) artificial
 - b) natural
 - c) both a and b
 - d) None of these
- 3) Green infrastructure is a design strategy based on improving _____ quality.
 - a) soil
 - b) water
 - c) stone
 - d) None of these
- 4) Gardening is the practice of growing and cultivating plants as part of _____.
 - a) horticulture
 - b) floriculture
 - c) sericulture
 - d) All of these
- 5) Landscape gardening can be defined as the decoration of a tract of _____.
 - a) sky
 - b) land
 - c) both a and b
 - d) None of these
- 6) A park is an area of _____ space set aside for human enjoyment.
 - a) natural
 - b) semi-natural
 - c) both a and b
 - d) None of these
- 7) Seed plants are the familiar green components of _____ landscapes.
 - a) wild
 - b) modified
 - c) managed
 - d) all of these
- 8) A seed is the result of _____ reproduction.
 - a) sexual
 - b) asexual
 - c) vegetative
 - d) All of these
- 9) There are _____ important types of seed.
 - a) four
 - b) Five
 - c) six
 - d) seven
- 10) Rupturing of seed coats or scarification by abrasion through machine _____.
 - a) threshing
 - b) filing
 - c) chipping
 - d) All of these

- B) Fill in the blank.** **06**
- 1) The hard seed coat is impermeable to water and _____.
 - 2) The _____ characteristics of a seed are laid down during the course of its development.
 - 3) Any _____ treatment that weakens the seed coat, is known as scarification.
 - 4) _____ treatment is also an effective method of breaking hard- seed.
 - 5) Method of breaking dormancy of light sensitive _____.
 - 6) There are _____ methods to break the dormancy of chilling requiring seeds.

- Q.2 Solve any Eight of the following.** **16**
- a) What is Nursery?
 - b) Give the definition of gardening.
 - c) What is mean by horticulture?
 - d) Define park.
 - e) What is seed?
 - f) Define the propagation.
 - g) Define cutflowers.
 - h) What is bonsai?
 - i) Give the definition of budding.
 - j) Define seed bank.

- Q.3 A) Attempt any Two of the following.** **10**
- 1) Explain the objective of nursery.
 - 2) Describe the computer application in landscaping.
 - 3) Describe the home garden studied by you.
- B) Write short notes any Two of the following.** **06**
- 1) Structure of seed
 - 2) Cutting
 - 3) Genetic erosion

- Q.4 A) Attempt any Two of the following.** **08**
- 1) Explain the types of layering studied by you.
 - 2) Give the types of seeds studied by you.
 - 3) Describe the seed production technology studied by you.
- B) Attempt any Two of the following.** **08**
- 1) Explain the budding vegetative propagation.
 - 2) Give the weed control method studied by you.
 - 3) Describe the cutflowers studied by you.

- Q.5 Attempt any Two of the following.** **16**
- a) Describe the importance of flower shows and exhibition studied by you.
 - b) Explain the biopesticides.
 - c) Explain the factor affecting seed viability.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
BOTANY (Special Paper – XVI)
Biostatistics (19201609)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.

Q.1 A) Select the correct alternative from the following. 10

- 1) T- test is developed by _____.
 a) R. A. fisher b) Carl Pearson
 c) William Gosset d) Laplace
- 2) Primary data is _____.
 a) Original data b) Result of survey
 c) Biased d) Result of inquiry
- 3) In a throw of coin _____ is the probability of getting tail.
 a) 1 b) 1/2
 c) 1/4 d) 1/3
- 4) Pie diagram is a _____.
 a) one dimensional diagram
 b) two dimensional diagram
 c) three dimensional diagram
 d) circular diagram
- 5) Mode is denoted by _____ sign.
 a) \bar{x} b) Σ
 c) Mo d) σ
- 6) _____ is not a measure of central tendency.
 a) Mean b) Mode
 c) Median d) Range
- 7) Statistical significance or the probability of finding Statistical significance is denoted by _____.
 a) Degree of freedom b) p value
 c) Standard deviation d) Standard error
- 8) The most repeated observation is _____.
 a) Mode b) Median
 c) Mean d) All the above
- 9) Median for arranged data is _____.
 a) Mean of first and last value
 b) Middle most value
 c) Most frequent value
 d) Last frequent value

- 10) _____ is not a step in calculation of the Chi- square statistics.
- Formulate the null hypothesis and determine the expected frequency of each answer
 - Determine appropriate significance level
 - Calculate the sample mean
 - Calculate the chi-square value

B) Answer in one sentence. 06

- Define bar graph.
- Who first worked out Standard deviation?
- What is range of a set of data?
- Define histogram
- Which letter is used for Arithmetic mean?
- What is a continuous variable in statistics?

Q.2 Solve any Eight of the following. 16

- Find out the mode of following set of number.
17, 19, 18, 17, 18, 19, 11, 17, 16, 19, 15, 15, 15, 17.
- What is the meaning of Central tendency?
- Write the simple formula of Chi square test.
- What did you mean by probability?
- Enlist the source of primary data.
- Write any two limitation of statistics.
- Enlist the types of probability.
- What is tabulation?
- Write the formula of standard deviation.
- Enlist the methods of sampling method.

Q.3 A) Attempt any Two of the following. 10

- Describe any two kinds of probability.
- Give merits of standard deviation.
- Describe in brief Co-efficient variation.

B) Write a note on parts of table. 06

Q.4 A) Attempt any Two of the following. 08

- Write precaution in the use of secondary data.
- Describe functions of statistics.
- An urn contain 10 white, 6 red balls and 10 Black. A ball is drawn at random. What is the probability that the ball is either white or red?

B) Describe methods of primary data collection. 08

Q.5 Attempt any Two of the following. 16

- Discuss various sources of published and unpublished data.
- Describe types of variables.
- Explain Student's t test.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Special Paper – XVI)
Applied Zoology (19201630)**

Day & Date: Monday, 22-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Draw neat labelled diagram wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Select the correct alternative from the following. 10

- 1) Macrobrachium malcolmsonni species widely used for _____ Culture.
 - a) prawn
 - b) crab
 - c) fish
 - d) pearl
- 2) Fish tuberculosis is a disease caused by _____.
 - a) virus
 - b) bacteria
 - c) fungus
 - d) protozoan
- 3) Hooks and lines are the examples of _____.
 - a) fish craft
 - b) fish product
 - c) fish habitat
 - d) fish gear
- 4) _____ is a powerful tools to analyze photoreceptor morphology, cell biology and regeneration.
 - a) Silver fish
 - b) Carps
 - c) Zebra fish
 - d) Sea star
- 5) The Rearing of fish in fresh water is called _____.
 - a) inland fishery
 - b) marine fishery
 - c) crustacean fishery
 - d) pearl fishery
- 6) Following _____ is an example of milch breed.
 - a) Hallikar
 - b) Nageri
 - c) Malvi
 - d) Sahiwal
- 7) Seed in fisheries refers to _____ of fish.
 - a) species
 - b) adult
 - c) egg
 - d) fin
- 8) Salting, drying and canning are the method of _____.
 - a) fish harvesting
 - b) fish preservation
 - c) fish transportation
 - d) fish marketing
- 9) Rearing of honey bee for honey and bee wax is known as _____.
 - a) apiculture
 - b) sericulture
 - c) moriculture
 - d) pisciculture
- 10) Which of the following silk is mainly produced in Assam?
 - a) Arundi silk
 - b) Natural silk
 - c) Muga silk
 - d) Tassar silk

- B) Give answer in one sentence. 06**
- 1) Poultry
 - 2) Dairy
 - 3) Pisciculture
 - 4) Sericulture
 - 5) Lac culture
 - 6) Importance honey bee in pollination
- Q.2 Solve any Eight of the following. 16**
- a) Fish seed
 - b) Inland fishery
 - c) Importance of lac
 - d) Mulberry as a food of silkworm
 - e) Transgenic animal
 - f) Nutritive value of egg
 - g) Cattle disease
 - h) Application of remote sensing in fishery
 - i) *Apis indica*
- Q.3 A) Attempt any Two of the following. 10**
- 1) Describe method of bee keeping.
 - 2) Explain the cast net.
 - 3) Describe life history of silk moth.
- B) Short note on. 06**
- Economic importance of silk.
- Q.4 A) Attempt any Two of the following. 08**
- 1) Explain culture of freshwater prawn.
 - 2) Explain life history of *Apis*.
 - 3) Describe marine fishery.
- B) Describe different type of milk product. 08**
- Q.5 Attempt any Two of the following. 16**
- a) Describe deep litter system of poultry housing.
 - b) Explain breeds of dairy animals.
 - c) Describe fish by products of fishing industry.

- h) Evaluate $\int_0^\pi \int_0^{a\theta} r^3 d\theta dr$
- i) Find the limits of the integration $\int \int f(x, y) dy dx$ over the region $y = 0, x = 2$ and $y = x^2$
- j) Write the formula to find the area bounded by the polar curve $r = f(\theta)$ and the lines $\theta = \alpha$ and $\theta = \beta$

Q.3 a) Attempt any two of the following: 10

- 1) Find the using double integration the area enclosed between parabolas $y^2 = 4ax$ and $x^2 = 4ay$
- 2) Prove that the improper integral of the first kind $\int_a^\infty \frac{dx}{x^p}$ converges if and only if $p > 1$.

- 3) Prove that $\beta(m, n) = 2 \int_0^{\pi/2} \sin^{2m-1} \theta \cos^{2n-1} \theta d\theta$ and hence evaluate $\int_0^{\pi/2} \sin^4 \theta \cos^5 \theta d\theta$

b) Change the polar co-ordinates and evaluate 06

$$\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dy dx.$$

Q.4 A) Attempt any two of the following: 08

- 1) Change the order of integration and evaluate $\int_0^1 \int_x^{2-x} \frac{x}{y} dx dy$.
- 2) If $f(x)$ and $g(x)$ are positive functions for all $x \geq a$ and $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = L$ is a nonzero finite number then prove that $\int_a^\infty f(x) dx$ and $\int_a^\infty g(x) dx$ behaves alike.

- 3) Prove that $\beta(p, q) = \frac{\Gamma(p) \cdot \Gamma(q)}{\Gamma(p+q)}$

B) Change to polar co-ordinates and hence evaluate 08

$$\int_0^a \int_{a-\sqrt{a^2-y^2}}^{a+\sqrt{a^2-y^2}} xy dx dy$$

Q.5 Attempt any two of the following. 16

- a) State and prove the Rodrigues Duplication formula for Gamma functions.
- b) Using the transformation $u = \frac{x^2+y^2}{x}, v = \frac{x^2+y^2}{y}$ evaluate $\iint \frac{(x^2+y^2)^2}{x^2y^2} dx dy$ over the area common to circles $x^2 + y^2 - ax = 0$ and $x^2 + y^2 - by = 0$
- c) State and prove the Dirichlet's test for convergence of improper integral of first kind.

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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Special Paper- XVI)
Programming in C (19201638-B)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Select the correct alternative from the following. 10

- 1) The 'C' language was developed along with the _____ operating system.
 - a) LINUX
 - b) MS-office
 - c) UNIX
 - d) XP
- 2) C programs are converted into machin language with the help of _____.
 - a) An editor
 - b) A complier
 - c) An operating system
 - d) None of these
- 3) _____ are only in lower case letters.
 - a) Keyword
 - b) Identifiers
 - c) Variables
 - d) Constant
- 4) Char data type required _____ bytes of memory.
 - a) 01
 - b) 02
 - c) 03
 - d) 04
- 5) The meaning of the operator "&&" is _____.
 - a) AND
 - b) LOGICAL AND
 - c) ADDRESS
 - d) LOGICAL OR
- 6) Math function for 'Arc cosine of x' is _____.
 - a) $\cos(x)$
 - b) $a \cos(x)$
 - c) $\cosh(x)$
 - d) $a \cosh(x)$
- 7) _____ pictorial representation of algorithm.
 - a) Algorithm
 - b) Flow chart
 - c) Program
 - d) None of these
- 8) _____ is conditional statement.
 - a) Switch
 - b) For
 - c) While
 - d) Dowhile
- 9) The character 'v' means _____.
 - a) new line
 - b) vertical line
 - c) vector
 - d) none of these
- 10) What is dimension of the C array `int org [10] [5]`.
 - a) 2
 - b) 5
 - c) 10
 - d) 50

- B) Fill in the blanks. 06**
- 1) With usual meaning expression $14\% - 3$ evaluate the value is _____.
 - 2) _____ operator used as Ternary operator.
 - 3) The _____ is the header file contains maths function.
 - 4) _____ is jumping statement.
 - 5) The range of index for an array of size 'n' is _____.
 - 6) _____ is the return type of function if no value returned from the function.

Q.2 Solve any eight of the following. 16

- a) What does int main (void) mean?
- b) If $x = 57$ and $y = 11$ the integer variable then find x/y and $x\%y$.
- c) Write use of size of operator.
- d) Give list of some keywords in c.
- e) Write the range of unsigned int data and how many bytes used for range of unsigned.
- f) Explain Arithmetic operators.
- g) Write note on simple if statement.
- h) Explain for statement.
- i) Give list the types of arrays.
- j) Define go to statement and write its syntax.

Q.3 A) Attempt any two of the following. 10

- 1) What is data type? Explain inbuilt data types.
- 2) Explain relational and logical operators.
- 3) Write program to find odd numbers from 1 to 20 by using for loop.

B) Discuss one and two dimensional arrays. 06

Q.4 A) Attempt any two of the following. 08

- 1) Describe the term basic structure of C programs.
- 2) Explain keywords and identifiers.
- 3) Explain increment and decrement operators.

B) Explain if ---else statement, nested if ---else statement and else if ladder. 08

Q.5 Attempt any Two of the following. 16

- a) Explain the while statement, Do---while statement and for statement.
- b) Explain the term formatted input and formatted output.
- c) Write a 'c' programme to convert the given temperature in Fahrenheit to Celsius using the following conversion formula $C = \frac{F-32}{1.8}$

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper – XVI)
Quality Management and Reliability (19201650)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 A) Select the correct alternative from the following. 10

- 1) Which charts are particularly more effective for sample size One?
 - a) P-charts
 - b) C-charts
 - c) \bar{X} & S chart
 - d) CUSUM Chart
- 2) Average Total Inspection for single sampling plan _____.
 - a) $n^*P + N^*(1 - P)$
 - b) $n^*P_a + N^*(1 - P_a)$
 - c) $N^*P + n^*(1 - P)$
 - d) $N^*P_a + n^*(1 - P_a)$
- 3) Control Chart is a _____.
 - a) Process monitoring tool
 - b) Process control tool
 - c) Both a and b
 - d) None of these
- 4) Which of these is not part of magnificent tools for Statistical Process Control?
 - a) Pareto chart
 - b) Flow chart
 - c) Scatter diagram
 - d) 2^k factorial design
- 5) A set of components whose functioning ensures the functioning of the system is known as _____.
 - a) path set
 - b) cut set
 - c) minimal path set
 - d) minimal cut set
- 6) Consumer's risk is probability of _____.
 - a) Accepting lot of good quality
 - b) Accepting lot of bad quality
 - c) Rejecting lot of good quality
 - d) Rejecting lot of bad quality
- 7) The purpose of Acceptance sampling is to _____.
 - a) Estimate lot quality
 - b) Sentence lots
 - c) Estimate lot defectives
 - d) Estimate lot conformity
- 8) The structure function of a binary system S takes any one of _____ possible values.
 - a) 4
 - b) 2
 - c) 3
 - d) None of these
- 9) Which of the following is not a Dimension of quality?
 - a) Performance
 - b) Aesthetics
 - c) Check sheet
 - d) Features

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
STATISTICS (Special Paper- XVI)
Time Series Analysis (19201651)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagrams wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of log table and calculator is allowed.

Q.1 A) Select the correct alternative from the following. 10

- 1) In time series values are arranged in _____ order.
 - a) increasing
 - b) chronological
 - c) decreasing
 - d) both a) and c)
- 2) Linear trend means _____.
 - a) no change
 - b) constant change
 - c) changes are in geometric progression
 - d) none of the above
- 3) Least square method _____.
 - a) reduces the calculations
 - b) does not give estimate of future
 - c) reduces the sum of squares of errors
 - d) is subjective
- 4) In time series analysis the method of moving averages, is used to estimate _____.
 - a) seasonal variations
 - b) trend
 - c) cyclical variations
 - d) irregular variations
- 5) Prosperity, Recession, Depression and Recovery in a business is an example of _____.
 - a) irregular trend
 - b) secular trend
 - c) cyclical trend
 - d) seasonal trend
- 6) A fire in a factory delaying production for some weeks is _____.
 - a) irregular trend
 - b) secular trend
 - c) cyclical trend
 - d) seasonal trend
- 7) Seasonal variations are _____.
 - a) short term variation
 - b) long term variation
 - c) sudden variation
 - d) none of the above
- 8) In moving average method, we cannot find trend values of some _____.
 - a) end points
 - b) middle points
 - c) starting and end periods
 - d) starting periods
- 9) In time series analysis, method of ratio to trend is used to estimate _____.
 - a) trend
 - b) seasonal variations
 - c) cyclical variations
 - d) irregular variations

- 10) In autoregressive model we assume that _____.
- the successive values in time series to be dependent
 - the successive values in time series to be independent
 - the regression analysis is better than time series analysis
 - the values in time series are non-normal

B) Fill in the blanks.

06

- The link relative is defined as _____.
- In time series additive model gives $Y =$ _____.
- In time series multiplicative model gives $Y =$ _____.
- Increase sales due to Diwali is due to _____ component time series.
- Increasing population is _____ component of time series.
- For testing of randomness _____ test is used.

Q.2 Define the following terms. (Any Eight)

16

- Trend
- Write note on irregular variations.
- What do you mean by stationarity?
- Define autocorrelation function.
- Explain the term 'season'.
- Describe the term 'Business cycle'.
- State the four components of time series.
- Write the difference between seasonal variations and cyclical variations.
- Write first order moving average MA (1) model.
- Write first order autoregressive model AR (1) model.

Q.3 A) Attempt any two of the following.

10

- Describe the progressive average method.
- Discuss the importance and utility of time series analysis in various fields.
- Describe the procedure of method of simple average.

B) Describe the procedure of single exponential smoothing.

06

Q.4 A) Attempt any two of the following.

08

- Describe the procedure of double exponential smoothing.
- Explain how to fit AR (1) model.
- Explain moving average method.

B) Illustrate with examples of the following term.

08

- Secular trend
- Seasonal variations
- Cyclical variations
- Irregular variations

Q.5 Attempt any Two of the following.

- a) Describe the procedure of link relative method.
- b) Describe the procedure of curve fitting least square method.
- c) Obtain the seasonal indices for the quarters by ratio to moving average method.

Year	Quarters No.			
	I	II	III	IV
2017	37	41	33	35
2018	37	39	36	36
2019	40	41	33	31
2020	33	44	40	40

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
GEOLOGY (Special Paper- XVI)
Geochemistry (19201655)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Draw neat labelled diagrams whenever necessary.

Q.1 A) Select the correct alternative from the following. 10

- 1) Which of the following mineral is most abundant in average mineralogical composition of Igneous rock?
 - a) Feldspar
 - b) Pyroxene & Hornblende
 - c) Quartz
 - d) Biotite
- 2) The radioactive decay of unstable nuclides, which causes variation in the isotopic composition of the daughter products.
 - a) Stable isotope
 - b) Isotopes
 - c) Radiogenic isotopes
 - d) None of the above
- 3) Chalcophile elements have an affinity for a _____ phase.
 - a) silicate
 - b) metallic liquid
 - c) sulphide liquid
 - d) volatile
- 4) The type of chemical bond that forms when atoms give away or take electrons is called as _____.
 - a) Molecular bond
 - b) Covalent bond
 - c) Ionic bond
 - d) Compound bond
- 5) Which of the following is an aerosol?
 - a) Smoke
 - b) Milk
 - c) Cheese
 - d) Butter
- 6) The small rounded bodies of chondrules consisting of hydrated iron magnesium silicate and containing up to 10% of complex organic compounds.
 - a) Chondrites
 - b) Carbonaceous chondrites
 - c) Achondrite
 - d) None of the above
- 7) The meteorites consist of average 50% metal and 50% silicate are _____.
 - a) Siderites
 - b) Siderolites
 - c) Aerolites
 - d) Tektites
- 8) Which of the following is the second most abundant elements of earth crust?
 - a) Oxygen
 - b) Carbon
 - c) Silicon
 - d) Hydrogen
- 9) Uranium-238 decays to which of the following daughter isotopes?
 - a) Rubidium-87
 - b) Uranium-235
 - c) Lead-206
 - d) Nitrogen-14

Seat
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
MICROBIOLOGY (Special Paper- XVI)
Environmental Microbiology (19201663)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.

Q.1 A) Select the correct alternative from the following. 10

- 1) _____ waste has dark brown colour due to presence of melanoidins pigment.

a) Paper and pulp	b) Textile
c) Distillery	d) Dairy
- 2) _____ is most hazardous metal pollution of automobile exhaust.

a) Lead	b) Copper
c) Iron	d) Mercury
- 3) _____ is the process of extracting metals from ore bearing rocks by using microorganisms.

a) Disintegration	b) Transformation
c) Bioleaching	d) Biodegradation
- 4) Impingement in liquid method is used for analysis of _____.

a) Water	b) Soil
c) Sewage	d) Air
- 5) In COD test. _____ is used as strong oxidising agent.

a) FeSO_4	b) $\text{K}_2\text{Cr}_2\text{O}_7$
c) Ferrous	d) KMnO_4
- 6) _____ will not cause atmospheric pollution.

a) H_2	b) CO
c) CO_2	d) SO_2
- 7) _____ degree Celsius temperature is used for incubation in BOD test.

a) 50	b) 29
c) 37	d) 20
- 8) Eutrophication of water bodies leading to killing of aquatic animals mainly due to non-availability of _____.

a) Food	b) Minerals
c) Oxygen	d) Carbon
- 9) The waste generated by Sugar industry is called _____.

a) CSL	b) PAP
c) SWL	d) Molasses
- 10) Psychrophilic microorganisms are growing at low _____.

a) Alkali	b) Temperature
c) Salinity	d) Acid

- B) Fill in the blanks.** **06**
- 1) The dust with pathogenic microorganisms is called _____ dust.
 - 2) Dairy waste is rich in _____ protein.
 - 3) Sieve Device method is used for _____ examination.
 - 4) _____ protect us from harmful effects of ultraviolet radiations.
 - 5) _____ is considered as an indicator of faecal pollution of water.
 - 6) _____ is the major gas present in clean and non-polluted air.
- Q.2 Solve any eight of the following.** **16**
- a) What are the droplet nuclei?
 - b) Give two examples of Thermophilic microorganisms.
 - c) Give the types of lakes.
 - d) Define Biosafety.
 - e) Give the two characteristics of Barophilic organisms.
 - f) What is Carbon sequestration?
 - g) Give the significance of Bio aerosols.
 - h) Define Bioremediation.
 - i) Give the two examples of organisms involved in Iron Leaching.
 - j) What are the factors affecting survival of microorganisms in Air?
- Q.3 A) Attempt any two of the following.** **10**
- 1) Write note on Acidophilic microorganisms.
 - 2) Write note on Microbially enhanced oil recovery.
 - 3) Give the role and objectives of Recombinant DNA Advisory Committee.
- B) Describe in detail Eutrophication process.** **06**
- Q.4 A) Attempt any two of the following.** **08**
- 1) Describe in brief Characteristic and treatment of sugar and distillery waste.
 - 2) Describe in detail BOD test.
 - 3) Write on sources of microorganisms in Air.
- B) Describe various methods to study Air borne microorganisms.** **08**
- Q.5 Attempt any Two of the following.** **16**
- a) Write an essay on Marine microorganisms.
 - b) Describe in detail Bioremediation.
 - c) Describe in Detail Microbial leaching.

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
ELECTRONICS (Special Paper- XVI)
Modern Communication Systems (19201684)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.
 4) Use of logtables and calculators is allowed

Q.1 A) Select the correct alternative from the following. 10

- 1) The refractive index of core is _____ that of clad.
 - a) less than
 - b) equal to
 - c) greater than
 - d) none
- 2) For high speed data transmission _____ is the best light source.
 - a) Neon lamp
 - b) LASER diode
 - c) Bulb
 - d) LED
- 3) For satellite communication _____ signals are used.
 - a) RF
 - b) IF
 - c) Light
 - d) Microwave
- 4) A communication band with uplink frequency of 6GHz and downlink frequency of 4 is known as _____.
 - a) C-band
 - b) X-band
 - c) Ka-band
 - d) Ku-band
- 5) In mobile communication the geographical area is divided into small regions called as _____.
 - a) element
 - b) cell
 - c) base station
 - d) exchange
- 6) In mobile phones SIM stands for _____.
 - a) subscriber identity module
 - b) system identity module
 - c) source identity module
 - d) none of these
- 7) _____ is a microwave device.
 - a) Zener diode
 - b) LED
 - c) Gunn diode
 - d) None of these
- 8) Klystron tube is based on the principle of _____ modulation.
 - a) amplitude
 - b) frequency
 - c) phase
 - d) velocity
- 9) In QPSK _____ modulation is/are used.
 - a) Amplitude
 - b) Phase
 - c) both amplitude and phase
 - d) none

10) In _____ network technology if one workstation is shutdown then entire network is affected.

- a) star
- b) ring
- c) bus
- d) none of these

B) Answer in one sentence.

06

- 1) Fiber optic communication is based on the principle of _____.
- 2) _____ is the main part of satellite.
- 3) _____ orbit is used for communication satellites.
- 4) The process of transferring an active call from one cell to another is called as _____.
- 5) What is modem?
- 6) What is protocol?

Q.2 Solve any eight of the following.

16

- a) Define bit rate and baud rate.
- b) What is splicer?
- c) What are step index and graded index fibers?
- d) Draw the block diagram of transponder.
- e) Give the uplink and down link frequencies in Ku-Band.
- f) What is geostationary satellite? Give its importance.
- g) Draw the block diagram of mobile transmitter.
- h) What are the advantages of microwave communication?
- i) What is wave guide? In which frequency range it is used?
- j) What are LAN and MAN?

Q.3 A) Attempt any two of the following.

10

- 1) Explain optical transmitter with suitable diagram.
- 2) Give the operational procedure of mobile communication.
- 3) Explain QPSK modem.

B) Write a note on Gunn diode.

06

Q.4 A) Attempt any two of the following.

08

- 1) Explain the working of Klystron.
- 2) Discuss any two applications of satellite communication.
- 3) Write a note on cavity resonator.

B) Explain different computer network topologies.

08

Q.5 Attempt any Two of the following.

16

- a) Explain fiber optic communication system with block diagram.
- b) With the help of block diagram explain earth station in satellite communication.
- c) Explain pulsed radar system with the help of block diagram.

Seat No.	
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B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper- XVII)
Advanced Python (19201671)

Day & Date: Monday, 22-04-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
 2) Draw neat labelled diagram wherever necessary.
 3) Figures to right indicate full marks.

Q.1 A) Multiple choice questions.

10

- 1) Correct way to draw a line in canvas tkinter?
 - a) line()
 - b) canvas.create_line()
 - c) create_line(canvas)
 - d) None of the above
- 2) What is Django's staticfiles app used for?
 - a) Serving static files like images, CSS, and JavaScript
 - b) Generating dynamic HTML
 - c) Handling user authentication
 - d) Storing data in cache
- 3) _____ method to change the size and location of the window.
 - a) Title()
 - b) Geometry
 - c) Resizable()
 - d) Attributes
- 4) Name the method which is used for displaying only one resultset.
 - a) fetchmany
 - b) fetchno
 - c) fetchall
 - d) fetchone
- 5) What is the use of SAX in XML documents?
 - a) Defining the format of an XML document
 - b) Validating the XML file
 - c) Parsing XML documents
 - d) None of the above
- 6) _____ is highest level GUI component in Tkinter.
 - a) Root window
 - b) Canvas
 - c) Container
 - d) Frame
- 7) _____ is used to create a superuser registering model in django.
 - a) Admin.py
 - b) Forms.py
 - c) Urls.py
 - d) Views.py
- 8) How pack() function works on tkinter widget?
 - a) According to x,y coordinate
 - b) According to row and column wise
 - c) According to left,right,up,down
 - d) None of the above
- 9) Render function takes _____ parameters.
 - a) 1
 - b) 2
 - c) 3
 - d) 4

10) _____ is used to draw pictures and other complex layout like graphics, text and widgets.

- a) Frame
- b) Canvas
- c) Button
- d) Label

B) Fill in the blanks**06**

- 1) _____ are used to arranging widgets in the frame.
- 2) A _____ is object that enables to work with database in python.
- 3) DOM stands for _____.
- 4) _____ is used to input the single line text from the user in Tkinter.
- 5) _____ method of cursor object is used to execute SQL commands in python.
- 6) A _____ is a built-in feature of Django that allows you to construct tables, fields, and constraints.

Q.2 Solve any eight of the following.**16**

- a) What is model in Django?
- b) What is SAX parser?
- c) What is the use of makemigrations command in Django?
- d) What is a spinbox in Tkinter?
- e) What is a Socket?
- f) What is a frame?
- g) Which method and model is used to connect MySql?
- h) Which are the various general socket methods?
- i) How to bind event?
- j) What is superuser in django?

Q.3 A) Attempt any two of the following.**10**

- 1) Explain pack layout Manager.
- 2) Explain server socket methods with example.
- 3) Explain the Django project directory structure.

B) Explain XML parser Architecture.**06****Q.4 A) Attempt any two of the following.****08**

- 1) Explain difference between MVC and MVT design patterns.
- 2) Write a Python program to create a Tkinter window with a canvas widget that displays a blue rectangle.
- 3) Explain in detail the steps of database connectivity of MySql.

B) Write a program to print IP address.**08****Q.5 Attempt any Two of the following.****16**

- a) Explain Container class of Tkinter with Example.
- b) Write a program to create a table and inserting record in table by using python.
- c) Explain Django's architecture.

Seat No.	
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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
Software Testing (19201671-01)**

Day & Date: Tuesday, 23-04-2024
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. 10

- 1) Which is non-functional software testing?
 - a) Unit Testing
 - b) Block box testing
 - c) Performance Testing
 - d) Regression testing
- 2) Which of the following is not a valid phase of Software Development Life Cycle?
 - a) Requirement Phase
 - b) Testing closure
 - c) Deployment phase
 - d) Analysis Phase
- 3) _____ loops fall between single and nested loops with respect to test cases.
 - a) Simple
 - b) Concatenated
 - c) Nested
 - d) None of these
- 4) Which of the following model is best for if requirements are easily understandable and defined?
 - a) Prototyping Model
 - b) V-Model
 - c) Waterfall Model
 - d) Spiral Model
- 5) Which Test Document is used to define the Exit Criteria of Testing?
 - a) Test Summary Report
 - b) Defect Report
 - c) Test Case
 - d) Test Plan
- 6) _____ are those software mistakes that occurred during the coding phase?
 - a) Bugs
 - b) Failures
 - c) Defects
 - d) Errors
- 7) What is functional testing?
 - a) Testing the functionality of the software system
 - b) Testing the performance of the software system
 - c) Testing the security of the software system
 - d) Testing the compatibility of the software system
- 8) Which of the following is NOT a characteristic of good test cases?
 - a) Independent
 - b) Repeatable
 - c) Traceable
 - d) Complex
- 9) Which is the most important feature of spiral model?
 - a) Quality management
 - b) Risk management
 - c) Performance management
 - d) Efficiency management

10) Equivalence partitioning uses _____ test cases to cover maximum requirements.

- a) fewest
- b) few
- c) many
- d) some

B) Fill in the blank.

06

- 1) In software, a _____ occurred when the expected output does not match the output provided by the software.
- 2) Cyclomatic Complexity is measured by _____.
- 3) Decision coverage = _____ /total number of outcomes *100.
- 4) _____ is a type of software testing, where the discrete component of the software is tested.
- 5) _____ document is usually prepared by the test leads after the entire application process is completed?
- 6) Writing a test summary report is a major task of _____.

Q.2 Solve any Eight of the following.

16

- a) List the various iterations of Loop testing?
- b) What are the errors uncovered by black box testing?
- c) What is Peer Review?
- d) List out components of defect report?
- e) What is Soak Testing?
- f) Define pre-condition and post-condition.
- g) Distinguish between Alpha & Beta Testing.
- h) What is Hybrid Model?
- i) Define Exploratory Testing.
- j) What is State transition testing?

Q.3 A) Attempt any Two of the following.

10

- 1) Explain path testing with suitable example.
- 2) Explain Regression Testing?
- 3) What are the goals of integration test? Compare Top-down and Bottom-up Integration Testing.

B) How Smoke Testing works. Explain with example?

06

Q.4 A) Attempt any Two of the following.

08

- 1) What are advantages and disadvantages of Prototype Model?
- 2) Why stress testing is needed? Explain with example.
- 3) Explain the components of test plan.

B) Design a Test case for simple calculator.

08

Q.5 Attempt any Two of the following.

16

- a) Explain Defect Life Cycle.
- b) Define Performance testing? What is the goal of performance testing? Explain different parameters are used for performance testing.
- c) How to prepare Requirement Traceability Matrix? Explain with example.

Seat No.	
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B.Sc. (Semester - IV) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Paper - VII)
Physical Chemistry (22221444)

Day & Date: Friday, 05-04-2024
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Draw neat diagrams and give equations wherever necessary.
 3) Figures to the right indicate full marks.
 4) Use of logarithmic tables and calculator is allowed.
 (At. Wts. H = 1, C = 12, O = 16, N = 14, Na = 23, Ag = 108, Cl = 35.5)

Q.1 Choose the most correct alternative.

08

- 1) The ionic product of water is given by _____.
 a) $[H^+] \times [OH^-]$ b) $[H^+] = [OH^-]$
 c) $[H^+] + [OH^-]$ d) $[H^+] - [OH^-]$
- 2) The distribution law for the solutes undergoing dissociation in one of the solvent is given as $K =$ _____.
 a) $\frac{c_1}{c_2}$ b) $\frac{c_1}{\sqrt{c_2}}$
 c) $\frac{c_1}{c(1-\alpha)}$ d) none of these
- 3) The entropy of perfectly crystalline substance at absolute zero Kelvin is _____.
 a) infinite b) zero
 c) non-zero d) all of these
- 4) Which of the following is completely soluble salt?
 a) NaCl b) PbSO₄
 c) AgCl d) BaSO₄
- 5) If the transport number of anion is 0.75, then T. N. of cation is _____.
 a) 0.50 b) 0.25
 c) 1.25 d) 1.75
- 6) In case of uni-univalent electrolytes, the equivalent and molecular conductance is _____.
 a) unequal b) equal
 c) both a and b d) none of these
- 7) Which of the following solid is crystalline in nature?
 a) plastic b) rubber
 c) glass d) common salt
- 8) Distribution law was given by _____.
 a) Henry b) Ostwald
 c) Nernst d) Van't Hoff

Q.2 Answer any four of the following

08

- State third law of thermodynamics.
- What is crystallography? Name three fundamental laws of crystallography.
- Define the terms:
 - Equivalent conductance
 - Molecular conductance
- Explain:
 - Lattice planes
 - Unit cell
- What are the types of conductors?

Q.3 Write short notes on any two of the following

08

- The entropy change in mixing of gases
- The moving boundary method
- The process of extraction

Q.4 Answer any two of the following

08

- Define entropy. Give physical significance of entropy.
- Discuss the factors affecting the value of transport number.
- What are the limitations of distribution law.

Benzoic acid (C_6H_5COOH) has its normal molecular weight in water. In the distribution of acid between water and benzene, the following results were obtained.

C_{water}	0.0148	0.020	0.018
C_{Benzene}	0.329	0.390	0.365

Calculate the molecular weight of benzoic acid in benzene.

Q.5 Answer any one of the following.

08

- Discuss in detail crystal structure of NaCl on the basis of Bragg's equation.
- Discuss in detail the Kohlrausch law.

Calculate the ionic mobilities of K^+ and OH^- ions at infinite dilution. The limiting ionic conductivities of K^+ and OH^- ions are $73.50 \times 10^{-4} \text{ S.m}^2.\text{mol}^{-1}$ and $197.6 \times 10^{-4} \text{ S.m}^2.\text{mol}^{-1}$ respectively. ($F = 965000 \text{ C.mol}^{-1}$)

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B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2024
ZOOLOGY (Special Paper - XII)
Wildlife Conservation & Management (19201523)

Day & Date: Saturday, 13-04-2024
 Time: 03:00 PM To 6:00 PM

Max. Marks: 80

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

Q.1 A) Multiple Choice Questions.

10

- 1) What is full form of WWF?
 - a) World Wildlife Fund
 - b) World Wildlife Foundation
 - c) World Wildlife Federation
 - d) World Wildlife Field
- 2) Wildlife mainly decreasing due to _____.
 - a) predation
 - b) cutting down forest
 - c) destruction of habitat
 - d) hunting
- 3) Long form of GPS _____.
 - a) Global positioning solar
 - b) Global positioning sector
 - c) Global positioning section
 - d) Global positioning system
- 4) Which of the following term is used to denote animal species of a particular region?
 - a) fern
 - b) fauna
 - c) flora
 - d) femina
- 5) Which one of the following areas in India is a hotspot of biodiversity?
 - a) Western Ghats
 - b) Gangetic Plain
 - c) Southern Ghat
 - d) Eastern Ghat
- 6) Which factor is not included in ecotourism?
 - a) responsible travel to natural area
 - b) conserve the environment
 - c) sustains of wellbeing of local people
 - d) hunting of animal
- 7) World Environmental Day celebrated on _____.
 - a) 4th June
 - b) 5th June
 - c) 6th June
 - d) 7th June
- 8) Which of the following uses maximum energy?
 - a) primary consumer
 - b) secondary consumer
 - c) primary producers
 - d) decomposer
- 9) Which of the following is the diversity index?
 - a) Upright index
 - b) Inverted index
 - c) Bell shaped index
 - d) Simpsons index

- 10) Which one of the following has the highest number of species in nature?
- a) Insect
 - b) Bird
 - c) Mammal
 - d) Reptile

B) Answer the following in one sentence. 06

- 1) Ecotourism
- 2) Pug mark
- 3) Wildlife
- 4) National Park in India
- 5) Carrying capacity
- 6) Climax

Q.2 Answer the following. (Any Eight) 16

- a) Negative values of wildlife
- b) Care of injured and diseased animal
- c) Great Indian bustard
- d) Sanctuaries in India
- e) Topography
- f) Diversity indices
- g) Steps in succession
- h) GIS
- i) Importance of wildlife conservation
- j) CITES

Q.3 A) Attempt any two of the following. 10

- 1) Population estimation with the help of faecal analysis of ungulates and carnivores.
- 2) Describe the preservation of general genetic Diversity.
- 3) Give important feature of protected areas in India.

B) Short Notes. 06

Explain wildlife tourism in forest.

Q.4 A) Attempt any two of the following. 08

- 1) Describe positive values of wildlife.
- 2) Explain biotelemetry of wild animal.
- 3) Describe Wildlife Protection Act 1972.

B) Describe great Indian bustard sanctuaries and their management 08

challenges in India.

Q.5 Attempt any two of the following. 16

- a) Explain tiger reserves in India.
- b) Describe Shannon and Simpsons diversity indices.
- c) Explain in detail on grazing, logging and mechanical treatment as habitat management practices.

Seat No.	
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B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
MATHEMATICS (Paper - II)
Calculus (22221117)

Day & Date: Monday, 03-06-2024
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

Q.1 Choose the correct alternative for each of the following.

08

- 1) If $y = \cos(ax + b)$ then $y_n = \underline{\hspace{2cm}}$.
- a) $a^n \sin(ax + b + \pi/2)$ b) $a^n \cos(ax + b + \pi/2)$
 c) $-a^n \sin(ax + b + \pi/2)$ d) $-a^n \cos(ax + b + \pi/2)$
- 2) If $y = \log(\sin x)$ then $y_2 = \underline{\hspace{2cm}}$.
- a) $\frac{1}{\sin^2 x}$ b) $-\frac{1}{\sin^2 x}$
 c) $\frac{1}{\cos^2 x}$ d) $-\frac{1}{\cos^2 x}$
- 3) An expression in X and Y is said to be homogeneous if sum of the degrees of x and y in every term is $\underline{\hspace{2cm}}$.
- a) distinct b) same
 c) finite d) both a) and c)
- 4) If Z is homogenous function of degree ' n ' in x and y and $z = F(u)$ then $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = \underline{\hspace{2cm}}$.
- a) $n F(u)$ b) $n F'(u)$
 c) $\frac{n F(u)}{F'(u)}$ d) $\frac{n F'(u)}{F(u)}$
- 5) $\int_0^{\pi/2} \cos^5 x dx = \underline{\hspace{2cm}}$.
- a) $\frac{15}{8}$ b) $\frac{15}{8}\pi$
 c) $\frac{8}{15}$ d) $\frac{8}{15}\pi$
- 6) $\int_0^1 x^5 \sin^{-1} x dx = \underline{\hspace{2cm}}$
- a) $\frac{11}{192}$ b) $\frac{11\pi}{192}$
 c) $\frac{5\pi}{192}$ d) $\frac{5}{192}$

Seat No.	
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Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2024
BOTANY (Paper – II)
Fungi and Archegoniate (22221103)

Day & Date: Monday, 03-06-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.

Q.1 Multiple choice questions.**08**

- 1) Term Archegoniate includes _____.
 - a) Bryophytes
 - b) Gymnosperms
 - c) Pteridophytes
 - d) All of these
- 2) Fungi are _____.
 - a) Autotrophic
 - b) Photosynthetic
 - c) heterotrophic
 - d) None of these
- 3) _____ is used as fungal biofertilizer.
 - a) BGA
 - b) VAM
 - c) NPK
 - d) All of these
- 4) Common mould that spoils jams and breads is _____.
 - a) Puccinia
 - b) Aspergillus
 - c) Penicillium
 - d) Mucor
- 5) Class Hepaticae belongs to _____.
 - a) Bryophytes
 - b) Gymnosperms
 - c) Pteridophytes
 - d) None of these
- 6) Fermentation of sugars is done by _____.
 - a) Saccharomyces
 - b) Aspergillus
 - c) Penicillium
 - d) Mucor
- 7) _____ is an ornamental plant.
 - a) Cycas
 - b) Oscillatoria
 - c) Ulva
 - d) Laminaria
- 8) The *Selaginella* shows _____ sporophyte.
 - a) homosporous
 - b) heterosporous
 - c) Monosporous
 - d) tetrasporous

Q.2 Answer any four of the following.**08**

- a) Write any four general characters of archegoniate?
- b) classify yeast
- c) Enlist parts of archegonium
- d) Name any two fungal SCP
- e) What is fragmentation?

- Q.3 Write short notes on any two of the following. 08**
- a) Morphology of Sporophyte of selaginella
 - b) Economic importance of gymnosperms
 - c) Budding in yeast
- Q.4 Answer any two of the following. 08**
- a) Explain anatomy of cycas leaflet with suitable diagram.
 - b) Describe asexual reproduction methods in Mucor.
 - c) Write any four General characters of Pteridophytes
- Q.5 Answer any one of the following. 08**
- a) Explain Sexual reproduction in Riccia along with labeled diagrams.
 - b) Describe Role of fungi in agriculture.

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B.Sc. (Semester - III) (Old) (CBCS) Examination: March/April-2024
COMPUTER SCIENCE (Paper-VI)
Design Analysis and Algorithm (19201308)

Day & Date: Monday, 03-06-2024
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All questions are compulsory.
 2) Figures to the right indicate full marks.
 3) Draw neat diagrams and give equations wherever necessary.

Q.1 Multiple choice questions.

08

- 1) _____ notation represents the upper bound of the running time of an algorithm.
 - a) Big-0 Notation (O-notation)
 - b) Omega Notation (Ω -notation)
 - c) Theta Notation (Θ -notation)
 - d) All of these
- 2) Dijkstra's Algorithm is used to solve _____ problems.
 - a) Network lock
 - b) single source shortest path
 - c) All pair shortest path
 - d) sorting
- 3) _____ method is used to solve the optimization problem.
 - a) Divide and conquer
 - b) Greedy
 - c) Dynamic problem
 - d) All of these
- 4) Floyd Warshall's Algorithm can be applied on _____.
 - a) Undirected and unweighted graphs
 - b) Undirected graphs
 - c) Directed graphs
 - d) Acyclic graphs
- 5) Branch and bound is a _____.
 - a) Problem solving technique
 - b) data structure
 - c) sorting algorithm
 - d) type of tree
- 6) The travelling salesman problem can be solved using _____.
 - a) A spanning tree
 - b) A minimum spanning tree
 - c) Bellman - Ford algorithm
 - d) DFS traversal
- 7) Min max problem is a type of _____ algorithm that is used in decision making.
 - a) back tracking
 - b) divide and conquer
 - c) Brute Force
 - d) none of these
- 8) Kruskal's algorithm is a _____.
 - a) divide and conquer algorithm
 - b) dynamic programming algorithm
 - c) greedy algorithm
 - d) approximation algorithm

Q.2 Answer any four of the following.

08

- a) What is Algorithm?
- b) Differentiate Time complexity and Space complexity.
- c) List out advantages of the greedy algorithm
- d) What do you mean by Huffman code?
- e) What is Divide and Conquer?
- f) What is prim's algorithm?

- Q.3 Write short notes on any Two of the following. 08**
- a) What are the types of Asymptotic notation?
 - b) What are the Applications of Divide and Conquer Approach?
 - c) What is Kruskal Algorithm?
- Q.4 Answer the any two of the following. 08**
- a) What is the Dijkstra's algorithm and use of Dijkstra's algorithm?
 - b) Explain n-queen Problem with example.
 - c) Difference between linear search and binary search.
- Q.5 Answer any one of the following. 08**
- a) Explain Knapsack Problem with example.
 - b) What is backtracking and explain how does Backtracking work?

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Set P

**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper - XIV)
Inorganic Chemistry (19201611)**

Day & Date: Monday, 03-06-2024
Time: 12:00 PM To 03:00 PM

Max. Marks: 80

- Instructions:** 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. 10

- 1) All lanthanons show a common stable _____ oxidation state.

a) +2	b) +3
c) +4	d) +5
- 2) In diborane, _____ 3c-2e bonds are present.

a) two	b) three
c) four	d) one
- 3) Name of $\text{HC} \equiv \text{CNa}$ is _____.

a) ethynyl sodium	b) acetylene sodium
c) sodium acetylene	d) sodium ethanide
- 4) Atmospheric corrosion involves _____ heterogeneous system.

a) liquid-solid	b) liquid-gas
c) solid-gas	d) solid-solid
- 5) Tinning is _____ type of method for protection of metals.

a) electrolytic	b) non-electrolytic
c) alloying	d) electroplating
- 6) The electronic configuration of Neptunium is _____.

a) $5f^4 6d^1 7s^2$	b) $5f^3 6d^2 7s^2$
c) $5f^3 6d^1 7s^2$	d) $5f^4 6d^0 7s^2$
- 7) In the preparation of $\text{YBa}_2\text{Cu}_3\text{O}_{7-x}$ superconductor the carrier gas contains _____.

a) Argon, oxygen and water vapour
b) Argon and oxygen
c) Oxygen and water vapour
d) Argon and water vapour
- 8) O-S-O bond angle in SO_2 is _____.

a) 120°	b) 109°
c) 104°	d) 119.5°

Q.5 Answer the following (Any Two).

16

- a) Explain in detail the preparation and structure of ceramic superconductor.
- b) What are transuranium elements? Discuss in detail their preparation.
- c) Discuss preparation, properties and uses of alkyl aluminium compounds

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Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2024
CHEMISTRY (Special Paper - XV)
Organic Chemistry (19201612)

Day & Date: Monday, 03-06-2024
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

Q.1 A) Choose the most correct alternative for each of the following. 10

- 1) _____ is used as antidiabetic.

a) Isoniazid	b) Ethambutal
c) palludrin	d) Tolbutamide
- 2) _____ stimulates latex production in trees.

a) Carbaryl	b) Sevin
c) Monocrotophos	d) Ethophan
- 3) In an organic compound the unsaturated groups with multiple bonds are called as _____.

a) auxochromes	b) heterochromes
c) chromophores	d) homochromes
- 4) _____ is laevo-rotatory broad-spectrum antibiotic.

a) Ibuprofen	b) Isoniazid
c) Chloromycetin	d) Penicillin
- 5) Pyrrole on nitration gives _____ nitro pyrrole.

a) 1	b) 2
c) 3	d) tetra
- 6) Isomers of the type of β - and α -glucosides are termed as _____.

a) dimers	b) enantiomers
c) anomers	d) monomers
- 7) Vat dye is an example of _____ dye.

a) water soluble	b) water insoluble
c) reactive	d) ingrain
- 8) In Cellulose, _____ glycosidic linkage is present.

a) β -1-4	b) β -1-2
c) α -1-4	d) α -1-2
- 9) Glucose on reaction with HI in presence of red P gives _____.

a) n-hexane	b) 2-hexane
c) hexene	d) heptane
- 10) Pyrrole is _____ in nature.

a) acidic	b) basic
c) amphoteric	d) neutral

- B) Define the following** **06**
- 1) Heterocyclic compounds
 - 2) Hormones
 - 3) Mutarotation
 - 4) Agrochemicals
 - 5) Dyes
 - 6) Antimalarial drugs
- Q.2 Answer the following questions. (Any Eight)** **16**
- a) Why pyridine is less reactive than benzene in electrophilic substitution reactions.
 - b) Give any one method of synthesis of pyrrole.
 - c) Draw the structure of thyroxine.
 - d) What are CNS drugs? Give any two types of CNS drugs.
 - e) Define insecticides with example.
 - f) State four qualities of good drug.
 - g) Give any two objections to open chain structure of glucose.
 - h) Draw the structure of sucrose.
 - i) What are the qualities of good dye?
 - j) Which acid will be produced on the ozonolysis of vitamin-A?
- Q.3 A) Answer the following questions. (Any Two)** **10**
- 1) Explain Skraup's synthesis of Quinoline.
 - 2) Give synthesis and uses of Methoxychlor and Indole 3-acetic acid.
 - 3) Discuss the analytical evidences put forth in the support of structure of adrenaline.
- B) Discuss classification of synthetic dyes based on method of application.** **06**
- Q.4 A) Answer the followings (Any Two):** **08**
- 1) Give the synthesis and uses of Phenolphthalein.
 - 2) Explain alkaline hydrolysis of Penicillin.
 - 3) How will you prove open chain structure of D-glucose.
- B) Define carbohydrates. How are they classified? Draw structure and state uses Starch and Cellulose.** **08**
- Q.5 Answer the following (Any Two).** **16**
- a) Define Vitamins. How they are classified? Write a synthesis of vitamin-A.
 - b) What are the qualities of an ideal drug? Write synthesis and uses of Phenobarbitone and Ibuprofen.
 - c) Give any one method of preparation of pyridine. Explain with reaction the action of following on pyridine?
 - i) $\text{KNO}_3 / \text{H}_2\text{SO}_4, 300^\circ\text{C}$
 - ii) $\text{SO}_3 / \text{H}_2\text{SO}_4$
 - iii) $\text{Br}_2 / \text{charcoal}$
 - iv) $\text{NaNH}_2 / 100^\circ\text{C}$