

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**ENGLISH (Compulsory)**  
**Literary Voyage**

Day & Date: Monday, 23-01-2023  
 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 alternatives from the options.**

**08**

- 1) What has been at the back of every speech Gandhiji delivered?
  - a) Abstinence
  - b) Religion
  - c) Teetotalism
  - d) Missionaries
- 2) How did Khushvant Singh travel to school in the city?
  - a) Car
  - b) On foot
  - c) Bicycle
  - d) Motor bus
- 3) What does R. Tagore desire not to be sheltered from?
  - a) Love
  - b) Compassion
  - c) Dangers
  - d) Cowardice
- 4) Which flowers competed for the title in 'The Lotus'?
  - a) Lily and Daisy
  - b) Rose and Daisy
  - c) Lily and Rose
  - d) Rose and Tulips
- 5) In the word 'Powerless' the element '-less' is an example of \_\_\_\_\_.
  - a) suffix
  - b) prefix
  - c) fix
  - d) fixing
- 6) The word that denotes action is termed as \_\_\_\_\_.
  - a) pronoun
  - b) adjective
  - c) adverb
  - d) verb
- 7) In the word 'Unhappy' the element 'Un-' is an example of a \_\_\_\_\_.
  - a) prefix
  - b) suffix
  - c) both a and b
  - d) none of the above
- 8) I like to read novels. The underlined word in this sentence is \_\_\_\_\_.
  - a) a verb
  - b) an adverb
  - c) noun
  - d) an article

**Q.2 Write the answers in short. (Any Four)**

**12**

- a) What is the message given in the poem 'Let Me Not Pray to be Sheltered from Dangers'?
- b) What is the subject matter of the poem 'The Lotus'?
- c) What did the father see in his child's bedroom in the poem 'The Toys'?
- d) Why did Gandhiji want to promote Khadi?
- e) What is the significance of the title of the poem 'The Toys'?
- f) Comment on the nature of the grandmother in the story 'The portrait of a Lady'.

- Q.3 Answer the following question. (Any one)** **10**
- a)** Define the word communication and state the components of the communication.
  - b)** Write in detail about the channels of communication.
- Q.4** Discuss the intrapersonal skills and the strategies to improve them. **10**

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Paper - I)**  
**Physical Chemistry**

Day & Date: Tuesday, 24-01-2023  
 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 scientific calculator is allowed.  
 (At. Wts.  $H = 1, C = 12, O = 16, N = 14, Na = 23, Cl = 35.5$ )

**Q.1 Choose the correct alternatives from the options & rewrite the sentence. 08**

- 1) The reaction between  $K_2S_2O_8$  and  $KI$  is an example of \_\_\_\_\_ reaction.
  - a) tetramolecular
  - b) unimolecular
  - c) pseudo
  - d) bimolecular
- 2) The point of intersection of two axes is called \_\_\_\_\_.
  - a) quadrant
  - b) origin
  - c) co-ordinates
  - d) all of these
- 3)  $P_c, V_c$  and  $T_c$  are known as \_\_\_\_\_.
  - a) gas constants
  - b) vander wall's constants
  - c) velocity constants
  - d) critical constants
- 4) Efficiency of heat engine is always \_\_\_\_\_.
  - a) greater than one
  - b) less than one
  - c) equal to one
  - d) all of these
- 5) If  $y = x^n$  then, \_\_\_\_\_.
  - a)  $dy/dx = x^{n-1}$
  - b)  $dy/dx = n x^{n-1}$
  - c)  $dy/dx = n^{x-1}$
  - d)  $dy/dx = x n^{x-1}$
- 6) Reactions in which the number of molecules involved is more than one but they still obey the kinetic equation of the first order reactions are called \_\_\_\_\_.
  - a) pseudounimolecular reactions
  - b) first order reactions
  - c) second order reactions
  - d) all of these
- 7) In adiabatic process \_\_\_\_\_.
  - a)  $q = w$
  - b)  $q \neq 1$
  - c)  $q = 0$
  - d)  $q = 1$
- 8) The parameter  $Z$  used to compare deviations of gases from ideal behavior is called \_\_\_\_\_.
  - a) gas constant
  - b) zeeman effect
  - c) critical constant
  - d) compressibility factor

**Q.2 Answer the following questions. (Any Four) 08**

- a) Give the statement of first law of thermodynamics.
- b) How temperature affects the rate of reaction?
- c) Define the term critical temperature.
- d) Define molecularity of a reaction.
- e) What is isotherm? Represent it graphically for an ideal gas.

- Q.3 Write short notes. (Any Two)** **08**
- a) What is pseudo-unimolecular reaction? Give its example.
  - b) What is differentiation? Explain any four rules of differentiation without proof.
  - c) What is meant by heat engine? Explain the efficiency of a heat engine on the basis of Carnot's cycle.
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Explain definite integral and write one example related to chemistry.
  - b) Write and explain the Joule-Thomson effect.
  - c) Discuss hydrolysis of methyl acetate in presence of an acid.
- Q.5 Answer the following questions. (Any One)** **08**
- a) What do you mean by second order reaction? Derive the expression for the velocity constant of the bimolecular reaction when the initial concentrations of the reactants are same.
  - b) What is mean by ideal and non-ideal gases?  
Van der Waals' constants for hydrogen chloride gas are  $a = 3.67 \text{ atm lit}^2$  and  $b = 40.8 \text{ ml mol}^{-1}$ . Find the critical temperature and critical pressure of the gas. ( $R = 0.0821$ ).



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper – I)**  
**Fundamental of Computer**

Day & Date: Tuesday, 24-01-2023  
 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 tables and calculator is allowed.

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

**08**

- 1) Which one of these is not input device?
  - a) Speaker
  - b) Mouse
  - c) Scanner
  - d) Keyboard
- 2) Which of the following is not OS?
  - a) Android
  - b) MAC
  - c) Opera
  - d) LINUX
- 3) Computer Monitor is also known as \_\_\_\_\_.
  - a) DVU
  - b) UVD
  - c) VDU
  - d) CCTV
- 4) MICR stands for \_\_\_\_\_.
  - a) Magnetic Ink Character Reader
  - b) Magnetic Ink Code Reader
  - c) Magnetic Ink Cases Reader
  - d) None of these
- 5) The output quality of a printer is measured by \_\_\_\_\_.
  - a) Dot per inch
  - b) Dot per sq. inch
  - c) Dots printed per unit time
  - d) All of above
- 6) Instructions and memory address are represented by \_\_\_\_\_.
  - a) Character code
  - b) Binary codes
  - c) Binary word
  - d) Parity bit
- 7) Which of the following memories must be refreshed many times per second?
  - a) Static RAM
  - b) Dynamic RAM
  - c) EPROM
  - d) ROM
- 8) The word processing task associated with changing the appearance of a document is \_\_\_\_\_.
  - a) Editing
  - b) Writing
  - c) Formatting
  - d) All of above

**Q.2 Answer the following questions. (Any Four)**

**08**

- a) What is flowchart?
- b) What is RAM and ROM?
- c) Define interpreter.
- d) What is full form of EEPROM?
- e) What is cache Memory?
- f) List all the secondary storage devices.

- Q.3 Write short notes. (Any Two)** **08**
- a) Scanner
  - b) Pseudo Code
  - c) Assembler
- Q.4 Answer the following questions. (Any Two)** **08**
- a) What are the difference between CRT and LCD monitor?
  - b) What are the various input pointing devices?
  - c) Write in details about printer and its types.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Explain the generation of computers in details.
  - b) Explain the evolution of computers.

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Paper - II)**  
**Inorganic Chemistry**

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)

- 1) The bond dissociation energy of NO molecule is \_\_\_\_\_ kJ/mole.  
a) 668                                      b) 494  
c) 292                                      d) 10170
- 2) The VBT has been developed by \_\_\_\_\_.  
a) Pauling and Slater                      b) Huckel, Hund and Mullikan  
c) K. Fajan                                  d) H. Bethe
- 3) According to MOT the carbon molecule \_\_\_\_\_ in nature.  
a) unstable                                  b) diamagnetic  
c) paramagnetic                          d) antiferromagnetic
- 4) The observed bond angle in NH<sub>3</sub> is 107.5° is due to presence of \_\_\_\_\_ lone pairs.  
a) four                                        b) one  
c) three                                      d) two
- 5) Compared with other bonds \_\_\_\_\_ forces are very strong.  
a) van der Waals                          b) hydrogen bonding  
c) metallic                                  d) ionic bonding
- 6) The size of cation is \_\_\_\_\_ its atomic size.  
a) equal to                                  b) greater than  
c) less than                                  d) none of these
- 7) \_\_\_\_\_ is the most electronegative element of the periodic table.  
a) Sodium                                  b) Fluorine  
c) Hydrogen                                  d) Helium
- 8) The maximum number of oppositely charged ions surrounding any particular ion is called \_\_\_\_\_ of that ion.  
a) EAN                                        b) atomic  
c) bonding number                          d) coordination number

- What trend of electron affinity in periodic table?
- Define covalent with suitable example.
- Write any two limitations of VBT.
- How the sigma ( $\sigma$ ) and pi ( $\pi$ ) orbitals are formed?
- Give the Schrodinger wave equation.

- Q.3 Write the short notes. (Any Two)** **08**
- a) Py-Py or Pz-Pz orbital overlap
  - b)  $sp^2$  Hybridisation
  - c) Solubility and crystal structure property of ionic solids
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Discuss in detail the trends in periodic table of:
    - 1) Atomic radii and
    - 2) Reactivity
  - b) Explain on the basis of MOT why  $Be_2$  molecule does not exist in nature.
  - c) Explain geometry of  $H_2O$  on the basis of VSEPR theory.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Define unit cell and stoichiometry and discuss in detail unit cell structure of cesium chloride.
  - b) Explain bond order, stability and magnetic property of oxygen molecule on the basis of molecular orbital theory.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.3 Write short notes: (Any Two)** **08**
- a) Table of String
  - b) Nested Structure
  - c) Storage Classes
- Q.4 Answer of the following questions. (Any Two)** **08**
- a) What is call by address? Explain with program.
  - b) Explain command line argument.
  - c) Write a short note on random access of file.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) Write a program to check given number is palindrome or not using function.
  - b) Write a program to show the concept of pointer to structure.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper – I)**  
**Mechanics and Properties of Matter**

Day & Date: Friday, 27-01-2023  
 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 Choose the correct alternatives from the options.**

**08**

- 1) Which of the following shape of the body can be considered as compound pendulum?
  - a) Cylindrical
  - b) Cubical
  - c) Cuboidal
  - d) Any rigid body
- 2) If radius of a spherical shell is doubled then its moment of inertia about its diameter \_\_\_\_\_.
  - a) Becomes two times
  - b) Reduces to half
  - c) Becomes four times
  - d) Remains constant
- 3) The matter which remains in its deformed condition is called \_\_\_\_\_ material.
  - a) plastic
  - b) elastic
  - c) Both of the above
  - d) None of the above
- 4) In the statement of Hooke's, law, the constant of proportionality E is called \_\_\_\_\_.
  - a) Modulus of rigidity
  - b) Modulus of elasticity
  - c) Young's modulus
  - d) Bulk modulus
- 5) Dimensions of moment of inertia are \_\_\_\_\_.
  - a)  $[M^0L^0T^1]$
  - b)  $[M^1L^0T^{-2}]$
  - c)  $[M^1L^2T^0]$
  - d)  $[M^0L^2T^0]$
- 6) Venturimeter is mainly used to determine the \_\_\_\_\_.
  - a) Density of the liquid
  - b) Rate of flow of liquid
  - c) Viscosity of liquid
  - d) Pressure of liquid
- 7) For copper,  $\eta = 4.2 \times 10^{10} \text{ N/m}^2$  and  $K = 14 \times 10^{10} \text{ N/m}^2$ . What is Poisson's ratio of copper?
  - a) 0.3636
  - b) 0.6363
  - c) 0.3366
  - d) 0.6633
- 8) A metallic disc is having mass 5 kg and radius 0.25 m. Calculate its moment of inertia about an axis passing through its centre and perpendicular to its plane.
  - a)  $0.15625 \text{ kg/m}^2$
  - b)  $0.15625 \text{ kg.m}^2$
  - c)  $0.15625 \text{ g.cm}^2$
  - d)  $0.15625 \text{ g/cm}^2$

- Q.2 Answer. (Any Four)** **08**
- a) State Hooke's law.
  - b) Define coefficient of viscosity. Write its unit and dimensions.
  - c) A spherical shell of mass 500 gm has diameter 15cm. Calculate moment of inertia about the diameter.
  - d) Define center of suspension and centre of oscillation.
  - e) Write the two factors affecting surface tension
- Q.3 Write short notes. (Any Two)** **08**
- a) Moment of inertia of flywheel
  - b) Factors affecting surface tension
  - c) Critical velocity and Reynold's number
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Derive the expression for Poisson's ratio of rubber.
  - b) For a Kater's pendulum the distance between the knife edges is 1 m. The time taken for 100 oscillations of the pendulum is 200.4 sec and 200.2 sec. respectively about the two knife edges. Find the value of acceleration due to gravity (g).
  - c) Water is escaping from a tank through a horizontal capillary tube 0.2 m long and 1.2 mm in diameter, when it stands 1 m above the tube. At what rate water is escaping? (Given  $\eta$  for water is  $0.001 \text{ N}\cdot\text{sec}/\text{m}^2$  and density of water  $= \rho = 1000 \text{ kg}/\text{m}^3$ ).
- Q.5 Answer the following questions. (Any One)** **08**
- a) Describe Jaeger's method to determine surface tension of a given liquid.
  - b) State and prove Bernoulli's theorem.



| Set | P |
|-----|---|
| 1   | 1 |
| 2   | 1 |
| 3   | 1 |
| 4   | 1 |
| 5   | 1 |
| 6   | 1 |
| 7   | 1 |
| 8   | 1 |
| 9   | 1 |
| 10  | 1 |
| 11  | 1 |
| 12  | 1 |
| 13  | 1 |
| 14  | 1 |
| 15  | 1 |
| 16  | 1 |
| 17  | 1 |
| 18  | 1 |
| 19  | 1 |
| 20  | 1 |
| 21  | 1 |
| 22  | 1 |
| 23  | 1 |
| 24  | 1 |
| 25  | 1 |
| 26  | 1 |
| 27  | 1 |
| 28  | 1 |
| 29  | 1 |
| 30  | 1 |
| 31  | 1 |
| 32  | 1 |
| 33  | 1 |
| 34  | 1 |
| 35  | 1 |
| 36  | 1 |
| 37  | 1 |
| 38  | 1 |
| 39  | 1 |
| 40  | 1 |
| 41  | 1 |
| 42  | 1 |
| 43  | 1 |
| 44  | 1 |
| 45  | 1 |
| 46  | 1 |
| 47  | 1 |
| 48  | 1 |
| 49  | 1 |
| 50  | 1 |
| 51  | 1 |
| 52  | 1 |
| 53  | 1 |
| 54  | 1 |
| 55  | 1 |
| 56  | 1 |
| 57  | 1 |
| 58  | 1 |
| 59  | 1 |
| 60  | 1 |
| 61  | 1 |
| 62  | 1 |
| 63  | 1 |
| 64  | 1 |
| 65  | 1 |
| 66  | 1 |
| 67  | 1 |
| 68  | 1 |
| 69  | 1 |
| 70  | 1 |
| 71  | 1 |
| 72  | 1 |
| 73  | 1 |
| 74  | 1 |
| 75  | 1 |
| 76  | 1 |
| 77  | 1 |
| 78  | 1 |
| 79  | 1 |
| 80  | 1 |
| 81  | 1 |
| 82  | 1 |
| 83  | 1 |
| 84  | 1 |
| 85  | 1 |
| 86  | 1 |
| 87  | 1 |
| 88  | 1 |
| 89  | 1 |
| 90  | 1 |
| 91  | 1 |
| 92  | 1 |
| 93  | 1 |
| 94  | 1 |
| 95  | 1 |
| 96  | 1 |
| 97  | 1 |
| 98  | 1 |
| 99  | 1 |
| 100 | 1 |

- Q.3 Write short notes. (Any Two)** **08**
- a) Koch's postulates
  - b) Germ theory of Disease
  - c) Size, shape, and arrangement of bacteria
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Give minimum four contributions of Louis Pasteur.
  - b) General characteristics and economic importance of Actinomycetes.
  - c) General principles of bacterial nomenclature.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Explain Spontaneous generation theory against biogenesis.
  - b) Discuss any four criteria of bacterial classification and identification.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper - II)**  
**Optics**

Day & Date: Saturday, 28-01-2023  
 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 diagrams must be drawn wherever necessary.  
 4) Use of log table and calculator is allowed.

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

**08**

- 1) The visible range is from \_\_\_\_\_.  
 a) 350 nm to 750 nm                      b) 3500 Å to 7500 Å  
 c) both a) and b) are correct              d) both a) and b) are incorrect
- 2) Grating spectra can be achieved on \_\_\_\_\_ side.  
 a) both                                          b) middle  
 c) one                                          d) centred
- 3) To increase the field of view and magnify power an extra lens introduced between objective and eye lens is called \_\_\_\_\_.  
 a) filed lens                                      b) eye lens  
 c) objective lens                                d) extra lens is not used
- 4) Collimator is part of \_\_\_\_\_.  
 a) microscope                                  b) spectrometer  
 c) stethoscope                                  d) optical bench
- 5) \_\_\_\_\_ is used in biprism experiment.  
 a) optical bench                                b) travelling microscope  
 c) spectrometer                                d) all of the above
- 6) In wedge shape films \_\_\_\_\_ fringes are observed.  
 a) circular                                      b) straight line  
 c) cylindrical                                    d) conical
- 7) There are \_\_\_\_\_ quantum processes to obtained laser output.  
 a) 1                                                  b) 2  
 c) 3                                                  d) 4
- 8) The formula for diffraction grating is given by \_\_\_\_\_.  
 a)  $n\lambda = \cos\theta d$                               b)  $n\lambda = \sin\lambda d$   
 c)  $n\lambda = \sin\theta d$                               d)  $n\lambda = \cos\lambda d$

**Q.2 Answer the following questions. (Any Four)**

**08**

- a) Define spherical and chromatic aberration.
- b) Distinguish between interference and diffraction.
- c) Draw the neat labelled energy level diagram that showing metastable state.
- d) Mention the functions of an eye-piece.
- e) State the important components of laser.
- f) Comparison between Ramsden and Huygens piece.

**Q.3 Write short note. (Any Two)****08**

- a) Schuster's method
- b) Newton's rings
- c) Two plano-convex lenses are separated by a distance of 2 cm to minimize spherical aberration. If the equivalent focal length of the combination is 6 cm find the focal lengths of the lenses.

**Q.4 Answer the following questions. (Any Two)****08**

- a) What is Fermat's principal of least time? Derive the law the reflection on the basis of Fermat's principal.
- b) Explain the experimental method to determine the wavelength of light using diffraction grating and hence find the grating element which has 15000 / inch.
- c) Obtain an expression fringe width of wedge shaped film for reflected ray.

**Q.5 Answer the following questions. (Any One)****08**

- a) What is the principle of gas laser? Explain construction and function of He-Ne laser.
- b) State and explain principal, construction and working of optical bench.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.3 Write the answers. (Any Two)** **08**
- a) Capsule staining
  - b) Structure of endo-spore
  - c) Resolving power and numerical aperture
- Q.4 Write the answers. (Any Two)** **08**
- a) Types of pili
  - b) Functions of cell membrane
  - c) Sterilization by gases
- Q.5 Write the answers. (Any One)** **08**
- a) Write on cell wall of Gram – Positive bacteria.
  - b) Write on sterilization by moist heat.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Paper - I)**  
**Descriptive Statistics-I**

Day & Date: Monday, 30-01-2023  
 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 alternatives from the options.****08**

- 1) The difference between the upper and lower limits of a class gives
  - a) The mid-point
  - b) The class intervals
  - c) The class frequency
  - d) None of the above
- 2) Which of the following is not an example of quantitative characteristics?
  - a) Height
  - b) Weight
  - c) Wages
  - d) Blood group
- 3) For the data classified according to 'n' attributes, total numbers of positive class frequencies are equal to
  - a)  $3^n$
  - b)  $n^2$
  - c)  $n^3$
  - d) Total no. of ultimate class frequencies
- 4) The sum of squares of deviations is minimum when deviations are taken from
  - a) mode
  - b) mean
  - c) median
  - d) zero
- 5) The most repeated observation is
  - a) median
  - b) mode
  - c) mean
  - d) all the above
- 6) Sum of absolute deviations of observations about median is always \_\_\_\_\_.
  - a) Zero
  - b) Minimum
  - c) Maximum
  - d) 1
- 7) The variance is zero only if all observations are the
  - a) Different
  - b) Square
  - c) Square root
  - d) Same
- 8) If Mean > Mode then the distribution is
  - a) symmetric
  - b) positively skewed
  - c) negatively skewed
  - d) none of these

**Q.2 Answer the following questions in brief. (Any Four)****08**

- a) Define frequency and cumulative frequency.
- b) Define ultimate class frequency.
- c) Define A.M. and G.M.
- d) Define raw moments and central moments.
- e) Define quartile deviation and standard deviation.

- Q.3 Write short notes. (Any Two)** **08**
- a) Explain the construction of histogram.
  - 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.4 Answer of the following questions. (Any Two)** **08**
- a) What is the effect of change of origin and scale on standard deviation?
  - b) Prove that Bowley's coefficient of skewness is lies between -1 and +1.
  - c) State and prove minimal property of mean square deviation.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) Define median and derive the formula for median in case of continuous frequency distribution.
  - b) Express the first four central moments in terms of raw moments.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Paper – I)**  
**Animal Diversity - I**

Day & Date: Monday, 30-01-2023  
 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 alternatives from the options.**

**08**

- 1) Protozoans are \_\_\_\_\_ organisms.
 

|                |                  |
|----------------|------------------|
| a) unicellular | b) multicellular |
| c) acellular   | d) viroids       |
- 2) A variety of invertebrate marine animals belonging to the phylum \_\_\_\_\_, characterized by a hard, spiny covering or skin.
 

|               |                  |
|---------------|------------------|
| a) Mollusca   | b) Echinodermata |
| c) Arthropoda | d) Protista      |
- 3) Myriapoda is a class of phylum \_\_\_\_\_.
 

|               |                  |
|---------------|------------------|
| a) Mollusca   | b) Echinodermata |
| c) Arthropoda | d) Protista      |
- 4) The dermal pores present on surface of sycon is called as \_\_\_\_\_.
 

|                |              |
|----------------|--------------|
| a) receptor    | b) prosopyle |
| c) madreporite | d) ostia     |
- 5) Octopus belongs to \_\_\_\_\_ class of phylum mollusca.
 

|                |                |
|----------------|----------------|
| a) aplacophora | b) cephalopoda |
| c) gastropoda  | d) Pelecepoda  |
- 6) Nematelminthes comprises of animals commonly called nematodes or \_\_\_\_\_.
 

|              |               |
|--------------|---------------|
| a) tape worm | b) round worm |
| c) flat worm | d) Bot fly    |
- 7) Jelly fish is the common name given to \_\_\_\_\_ phase of subphylum medusozoa of major phylum cnidaria.
 

|            |           |
|------------|-----------|
| a) gametes | b) eggs   |
| c) polyp   | d) medusa |
- 8) \_\_\_\_\_ organs produce by amoeba to transport from one place to another place.
 

|             |                |
|-------------|----------------|
| a) Flagella | b) Cilia       |
| c) Polyp    | d) Pseudopodia |

**Q.2 Answer the following questions in brief. (Any Four)**

**08**

- a) Define the term 'Polymorphism'.
- b) Write any two parasitic adaptations in *Ascaris lumbricoides*.
- c) State any two economic importance of insects.
- d) What is the importance of water vascular system in Asteroidea?
- e) Draw and label canal system in Sycon

- Q.3 Write Short Notes. (Any Two)** **08**
- a) Write about nutrition and locomotion in Protozoa- Amoeba.
  - b) Discuss polymorphism in hydrozoa.
  - c) Write characteristics of kingdom protista.
- Q.4 Answer of the following questions. (Any Two)** **08**
- a) Write about metamorphosis in insects.
  - b) Classify with example Phylum Cnidaria.
  - c) Write general characters of phylum Arthropoda.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) Describe life history of *Taenia solium*.
  - b) Write general characters of phylum mollusca.



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

- a) Define sure event and impossible event.
- b) Ten seeds are planted and total number of seeds germinated is recorded after a week. Write down an appropriate sample space for this experiment.
- 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) Define mutually independent events.

**Q.3 Write short notes. (Any Two)****08**

- a) Write down the sample space for the following events.
  - 1) A leap year will have 53 Sundays
  - 2) A non-leap year will have 53 Sundays
- b) With usual notation prove that
  - 1)  $P(\varphi) = 0$
  - 2)  $P(\bar{A}) = 1 - P(A)$
- c) If  $A \subset B$ , then prove that
  - 1)  $P(B/A) = 1$
  - 2)  $P(A/B) = \frac{P(A)}{P(B)}$

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

- a) If  $P(A) = 0.50$ ,  $P(B) = 0.60$ ,  $P(B/A) = 0.90$ . Find the probability that
  - 1) A and B both happens
  - 2) A happens given that B has happened
- b) A and B are two events defined on sample space  $\Omega$  such that  $P(A) = \frac{1}{4}$ ,  $P(B) = \frac{1}{5}$ ,  $P(A \cap B) = \frac{1}{7}$ . Find.
  - 1)  $P(\bar{A} \cup \bar{B})$
  - 2)  $P(A \cap \bar{B})$
- c) Suppose we conduct an experiment where ordered pair of integers (X,Y) are observed. The restriction on (X,Y) are as follows  $1 \leq X \leq 3$ ,  $1 \leq Y \leq 3$ ,  $X \neq Y$ . Let A be the event that product of X and Y is less 5 and B be the event that sum of X and Y is greater than 2. Write down the appropriate sample space  $\Omega$  and event A and B.

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

- a) Prove that for any two events A and B  

$$P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)$$
- b) State and prove Baye's theorem on probability.

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Paper – II)**  
**Animal diversity-II**

Max. Marks: 40

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

08

- Protochordates are called as Acraniata because they lack \_\_\_\_\_.
  - a) Head
  - b) Cranium
  - c) Vertebralcolumn
  - d) Head & Cranium
- Agnatha are \_\_\_\_\_ fish.
  - a) Bony
  - b) Jawless
  - c) Cartilagenous
  - d) None of these
- A fish is characterised by the presence of \_\_\_\_\_.
  - a) Dermal scales
  - b) Pairedfins
  - c) Pharyngealgills
  - d) All the above
- Salamander belongs to the class \_\_\_\_\_.
  - a) Reptile
  - b) Amphibia
  - c) Aves
  - d) Mammalia
- Axolotl larva belongs to the order \_\_\_\_\_.
  - a) Urodela
  - b) Anura
  - c) Apoda
  - d) Stegocephalia
- The important character of cobra is \_\_\_\_\_.
  - a) Presence of hood
  - b) Smallscales on head
  - c) Rounded tail
  - d) None of these
- Characteristics feature of aves is \_\_\_\_\_.
  - a) Presence of beak & feather
  - b) Ability to lay eggs
  - c) Air spaces in lung
  - d) All the above
- External ears are characteristic of \_\_\_\_\_.
  - a) Birds
  - b) Mammal
  - c) Birds & Mammal
  - d) Mammals & Reptiles

08

- a) Cephalochordate
- b) Cyclostomata
- c) Bony fishes
- d) Chameleon
- e) Aquatic mammals

08

- a) Urochordate**  
**b) Wall lizard**  
**c) Morphological adaptations in birds**

**Q.4 Answer the following questions. (Any Two)****08**

- a) Explain symptoms of snake bite.
- b) Give general characters of aves.
- c) Terrestrial habitat in mammals.

**Q.5 Answer the following questions. (Any One)****08**

- a) Describe poisonous-non poisonous snake with suitable example.
- b) Describe the diversity in mammals with suitable example.

Set P

Max. Marks: 40

08

**Q.2 Answer the following questions in brief. (Any Four)**

08

- a) Prove that,  $\cosh^2 z - \sinh^2 z = 1$
- b) If  $z$  is any complex number then show that  
 $\sinh_z^{-1} = \log(z + \sqrt{z^2 + 1})$
- c) Find all values of  $(-1)^{1/3}$
- d) Find the augmented matrix  $[A, B]$  of the following equations and reduce it to echelon form.  
 $x + y + 3z = 1$  ;  $2x + 3y - z = 3$  ;  $5x + 7y + z = 7$
- e) Solve the equations.  
 $x - y + z = 0$  ;  $x + 2y - z = 0$  ;  $2x + y + 3z = 0$
- f) Find the rank of matrix to the normal form.  

$$\begin{bmatrix} 1 & 3 & 4 & 5 \\ 1 & 2 & 6 & 7 \\ 1 & 5 & 0 & 10 \end{bmatrix}$$

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

08

- a) Evaluate  $\int \sin^4 \theta \, d\theta$  by using  $x = \cos \theta + i \sin \theta$
- b) Find the eigen value and eigen vector of the matrix.  

$$A = \begin{bmatrix} 2 & -2 & 2 \\ 1 & 1 & 1 \\ 1 & 3 & -1 \end{bmatrix}$$
- c) If  $\cos(\alpha + i\beta) = x + iy$  then prove that  
 1)  $\frac{x^2}{\cosh^2 \beta} + \frac{y^2}{\sinh^2 \beta} = 1$   
 2)  $\frac{x^2}{\cosh^2 \alpha} + \frac{y^2}{\sinh^2 \alpha} = 1$

**Q.4 Answer of the following questions. (Any Two)**

08

- a) Find characteristic equation of matrix.  $A = \begin{bmatrix} 1 & 2 & 2 \\ 2 & 1 & 2 \\ 2 & 2 & 1 \end{bmatrix}$  Also find  $A^{-1}$  by using Cayley–Hamilton theorem.
- b) Discuss the solution of the system of equations.  
 $x + y + z = 6$  ;  $2x + y + 3z = 13$  ;  $5x + 2y + z = 12$
- c) If  $p$  and  $q$  are roots of equation  $x^2 - 2x + 2 = 0$  then prove that  
 $p^n + q^n = 2^{\frac{n+2}{2}} \cos \frac{n\pi}{4}$

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

08

- a) State and prove DeMoivre's theorem.
- b) State and prove Cayley-Hamilton theorem.



**Seat  
No.**

## Max. Marks: 40

08

- 08

- 08

- Page 1 of 2

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

**08**

- a) Write general characters of Xanthophyta.
- b) What are the divisions of algae according to G. M. Smith?
- c) Explain Transformation process in Bacteria.

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

**08**

- a) Explain Sexual reproduction in *Sargassum* along with labeled diagrams.
- b) Describe Ultrastructure of Bacterial Cell.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Paper- II)**  
**Calculus**

Day & Date: Friday, 24-03-2023  
 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 alternatives from the options.**

**08**

- 1) If  $y = (3x + 5)^7$  then  $y_8 =$  \_\_\_\_\_.
  - a)  $7! 3^7$
  - b)  $\frac{7!}{2!} 3^5 (3x + 5)^2$
  - c)  $7(3x + 5)^6$
  - d) 0
- 2) The formulae of L' Hospital rule is \_\_\_\_\_.
  - a)  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$
  - b)  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow a} \frac{f'(x)}{g'(x)}$
  - c)  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \lim_{x \rightarrow c} \frac{f'(x)}{g'(x)}$
  - d)  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = \frac{f(a)}{g(a)}$
- 3) The expansion of  $\frac{1}{1-x}$  is \_\_\_\_\_.
  - a)  $1 - x + x^2 - x^3 + x^4 + \dots$
  - b)  $1 + x + x^2 + x^3 + x^4 + \dots$
  - c)  $1 - x + \frac{x^2}{2} - \frac{x^3}{3} + \frac{x^4}{4} + \dots$
  - d)  $1 + x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \dots$
- 4) The degree of homogeneous function  $f(x, y) = \frac{x+y}{x-y}$  is \_\_\_\_\_.
  - a)  $\frac{1}{2}$
  - b) 1
  - c) 0
  - d) 2
- 5) If  $u$  is homogeneous function of  $x$  &  $y$  of degree 'n' then  $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} =$  \_\_\_\_\_.
  - a)  $\frac{F(u)}{F'(u)}$
  - b)  $n \frac{F(u)}{F'(u)}$
  - c)  $n \frac{F'(u)}{F(u)}$
  - d)  $\frac{1}{n} \frac{F(u)}{F'(u)}$
- 6) The value of  $\int_0^{\pi/2} \cos^5 x \, dx =$  \_\_\_\_\_.
  - a)  $15/8$
  - b)  $15/8 \pi$
  - c)  $8/15$
  - d)  $8/15 \pi$
- 7) If  $\phi$  is constant then  $\nabla \phi$  is \_\_\_\_\_.
  - a) 0
  - b) positive
  - c) negative
  - d) infinite



Set P

Max. Marks: 40

08

08

- Q.3 Write Short Notes. (Any Two)** **08**
- a) Give in details on morphology of Agaricus.
  - b) Write a note on roles of Fungi in agriculture.
  - c) Asexual reproduction in mucor.
- Q.4 Answer of the following questions. (Any Two)** **08**
- a) Describe asexual reproduction in saccharomyces.
  - b) Describe the economic importance of Bryophytes.
  - c) Describe in details microsporangium of selaginella.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) Explain the sexual reproduction in cycas.
  - b) Describe the antheridia and archegonia of Riccia.



- Q.3 Write short notes. (Any Two)** **08**
- a) Maximum power transfer theorem.
  - b) Phase relation of current and voltage in pure inductor.
  - c) Electromechanical relay.
- Q.4 Answer of the following questions. (Any Two)** **08**
- a) Explain series resonance in LCR circuit.
  - b) Explain constant voltage source and constant current source.
  - c) Explain superposition theorem.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) State Thevenin's theorem. Explain the steps involved in applying Thevenin's theorem.
  - b) What is resistor? Explain different types of resistors.



---

## Max. Marks: 40

Page 1 of 2

- Q.2 Answer of the following any four.** **08**
- a) Classification of Interior earth by Vander Gracht.
  - b) State the branches of physical geography.
  - c) Classify the igneous rocks on the basis of silica content.
  - d) Block mountain.
  - e) Focus of earthquake.
  - f) Describe the folding process.
- Q.3 Write a short notes on any two of the following.** **08**
- a) Classify the volcanoes on the basis of its periodicity.
  - b) Describe the types of metamorphic rocks.
  - c) Disadvantages of earthquake and volcanoes.
- Q.4 Answer any two of the following.** **08**
- a) Describe the world seismic zone on earth surface.
  - b) Explain the types of fold with schematic diagrams.
  - c) State Earth movement and classify it with schematic diagrams and good examples.
- Q.5 Answer any one of the following.** **08**
- a) Describe the concept Wegener's continental drift theory.
  - b) State the formation process of igneous rocks with its characteristics and economic importance.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Paper – I)**  
**Physical Geology**

Day & Date: Tuesday, 28-03-2023  
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

### Q.1 Multiple choice questions

08

- 1) Ozone is found in \_\_\_\_\_.  
a) Stratosphere  
b) Thermosphere  
c) Mesosphere  
d) Crust
- 2) Composition of Core is \_\_\_\_\_.  
a) Si + Al  
b) Si + Mg  
c) Ni + Fe  
d) Fe + Al
- 3) Which of the following factors control weathering process?  
a) Types of natural agents  
b) Type of rocks  
c) Intensity of natural agents  
d) All of the above
- 4) Process of frost action is common at \_\_\_\_\_.  
a) Mountains  
b) Basins  
c) Plateaus  
d) Deserts
- 5) Which of the following is not a type of discontinuity of the earth interior?  
a) Lehmann  
b) Gutenberg  
c) Brunton  
d) Mohorovic
- 6) Nebular hypothesis of earth origin was given by \_\_\_\_\_.  
a) Nicholas Steno  
b) Laplace and Kant  
c) Jean and Jeffery  
d) James Hutton
- 7) Line joining focus and epicenter of the earthquake is called \_\_\_\_\_.  
a) seismic waves  
b) strike  
c) seismic vertical  
d) Iso-seismic lines
- 8) Sial and Sima are part of \_\_\_\_\_.  
a) Atmosphere  
b) Troposphere  
c) Mesosphere  
d) Lithosphere

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

08

- Define Earthquake.
- Draw labeled diagram illustrating Focus and Epicenter.
- What is Mohorovic Discontinuity?
- Which is the coldest layer of the Atmosphere?
- Give any two characters of Basic lava.

**Q.3 Write short notes. (Any Two)**

08

- a)** Seismograph  
**b)** Crust of the earth  
**c)** Rock cycle

- Q.4 Answer of the following questions. (Any Two) 08**
- a) Explain characters of primary seismic waves.
  - b) Explain Spheroidal weathering.
  - c) Describe Pyroclastic products of volcano.
- Q.5 Answer of the following questions. (Any One) 08**
- a) Define Volcano. Describe Central and Fissure types of Volcanoes.
  - b) Define Weathering. Explain any three types of chemical weathering processes.



**Q.3 Write short notes (Any Two)**

- a) Perform the binary subtraction
  - 1)  $(11010)_2 - (10111)_2$
  - 2)  $(11101)_2 - (10111)_2$
- b) Convert the  $(48)_{10}$  into its equivalent binary and octal number.
- c) Reduce logic equation using Boolean algebra.
  - 1)  $Y = BC + \overline{BCD} + B$
  - 2)  $Y = (\overline{AB} + \overline{A} + \overline{B})\overline{AB}$

**Q.4 Answer of the following questions. (Any Two)**

- a) State and prove De-Morgan's theorems.
- b) By using the K map reduce the logic equation.
 
$$Y = A\overline{B}C\overline{D} + A\overline{B}C\overline{D} + \overline{A}B\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + A\overline{B}C\overline{D} + \overline{A}\overline{B}C\overline{D} + A\overline{B}\overline{C}\overline{D} + A\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}\overline{C}\overline{D}$$
- c) What do you mean by codes? State their types. Explain Excess-3 code with examples of addition.

**Q.5 Answer of the following questions. (Any One)**

- a) Why NOR / NAND gate is called a universal gate? Give the construct of basic gates by using NOR and NAND gates only.
- b) Give the construction of the half and full subtractor by using basic gates with their truth table.

**B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2022**  
**GEOGRAPHY (Paper - II)**  
**Geomorphology - II**

Max. Marks: 40

**Instructions:**

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams and map must be drawn wherever necessary.
- 4) Use of map stencil is allowed.

08

- 1) The water or acids dissolved contents is called \_\_\_\_\_.  
a) Oxidation                      b) Solution  
c) Carbonation                  d) Chelation
- 2) The Action of external forces causes the rock to erode, but the properties do not change This action is called \_\_\_\_\_ weathering.  
a) Mechanical                    b) Chemical  
c) Biological                     d) Oxidation
- 3) The Kettle like small depression found in river valley Pot holes of much bigger size is called \_\_\_\_\_.  
a) Delta                            b) George  
c) Waterfall                       d) Pot holes
- 4) The concept geographical cycle of erosion presented by \_\_\_\_\_.  
a) James Hutton                  b) Charles Darwin  
c) W.M. Davis                    d) None of them
- 5) Canyon Landforms is formed due to \_\_\_\_\_ the action of river.  
a) Erosional                       b) Transportational  
c) Depositional                   d) Weathering
- 6) Blow out or Deflation Hollows is formed due to the \_\_\_\_\_ action of the wind.  
a) Erosional                       b) Transformational  
c) Depositional                   d) Weathering
- 7) Roche Moutonnee is formed by the action of the \_\_\_\_\_.  
a) Wind                            b) River  
c) Sea waves                      d) Glaciers
- 8) Low residual hills found on pene plain known as \_\_\_\_\_.  
a) Monad nocks                   b) Meander  
c) Sand dunes                    d) Bar khan

08

- Define physical Weathering.
- Write the Causes of Mass Wasting.
- Explain the first stage of cycle of Erosion.
- Write the name of Depositional Landforms made by Coastal.
- Define Bays and Headland.

- Q.3 Write short notes. (Any Two)** **08**
- a) Mushroom Rock
  - b) Wave Built Platform
  - c) 'V' Shaped Valley
- Q.4 Answer of the following questions. (Any Two)** **08**
- a) Define Chemical weathering and explain the types of Chemical Weathering.
  - b) Describe the types of Mass Wasting.
  - c) Describe Depositional Landforms made by Glacier.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) Explain Theory of Cycle of Erosion by W.M. Davis.
  - b) Describe Erosional Landforms made by River with suitable diagram.



**Seat  
No.**

Day & Date: Monday, 27-03-2023  
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 wherever needed.

08

- 1) A branch of geology deals with the systematic study of ancient life preserved in the rocks is called \_\_\_\_\_.  
a) petrology                      b) paleontology  
c) petrography                  d) physiography
- 2) Fossils of organisms with spines on their shells belong to \_\_\_\_\_ phylum.  
a) Echinodermata                b) Coelenterata  
c) Arthropoda                     d) Brachiopoda
- 3) Turritella shell belongs to \_\_\_\_\_ class.  
a) cephalopod                    b) gastropod  
c) brachiopod                    d) lamellibranches
- 4) Trace fossils indicate \_\_\_\_\_.  
a) coal formation                b) locomotion of animals  
c) plant impression              d) none of these
- 5) The exoskeleton of phylum mollusca, made up of hard, secreted, calcareous material is called as \_\_\_\_\_.  
a) umbo                            b) lunule  
c) shell                            d) hinge
- 6) Body whorl is present at \_\_\_\_\_.  
a) base                              b) apex  
c) top                                d) anterior
- 7) The main characteristic of fossil is its preservation in \_\_\_\_\_.  
a) Soil                                b) Sediments  
c) Ice                                 d) Lava
- 8) Plant leaves are preserved in \_\_\_\_\_ rock.  
a) Arenaceous                    b) Rudaceous  
c) Lava                               d) Argillaceous

08

- Condition of fossilization
- Define fossil
- Imprints
- Pecten
- Echinus

- Q.3 Answer the following questions. (Any Two)** **08**
- a) Describe petrification and carbonification.
  - b) Describe the uses of fossils.
  - c) Describe apical system in echinoderms.
- Q.4 Answer of the following questions. (Any Two)** **08**
- a) Describe morphology of gastropod shell.
  - b) Describe the mould and cast.
  - c) Describe Glossopteris and Gangamopteris.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) Describe the classification and morphology of trilobites.
  - b) Explain in details phylum brachiopoda.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.3 Answer the following question. (Any one)** **10**
- a)** Write about the process of communication in detail.
  - b)** Write about the principles of effective communication.
- Q.4** Write a description about your memorable tour with your family members. **10**

**Seat  
No.**

Day & Date: Tuesday, 24-01-2023  
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 algorithmic tables and calculator is allowed.  
(At. Wt. H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

08

- 1) All natural processes are \_\_\_\_\_.  
a) spontaneous                      b) non-spontaneous  
c) reversible                         d) isothermal
- 2) The half life of \_\_\_\_\_ order reaction is independent of initial concentration of reactant.  
a) zero                                  b) first  
c) second                                d) third
- 3) Efficiency of a heat engine is \_\_\_\_\_.  
a) zero                                  b) one  
c) less than one                        d) greater than one
- 4) The unit for rate constant of first order reaction is \_\_\_\_\_.  
a)  $\text{lit mol}^{-1} \text{sec}^{-1}$                       b)  $\text{lit mol sec}^{-1}$   
c)  $\text{sec}^{-1}$                                   d) sec
- 5) If the rate expression for a given reaction is given by  $dx/dt = kA^{3/2}B^{1/2}$ , the net order of reaction is \_\_\_\_\_.  
a)  $3/2$                                       b)  $1/2$   
c) 1                                         d) 2
- 6) The gas compressibility factor Z for an ideal gas is \_\_\_\_\_.  
a) zero                                  b) equal to one  
c) less than one                        d) greater than one
- 7) In a typical graph, the straight line obtained is parallel to the x-axis. The slope of this line will be \_\_\_\_\_.  
a) 0                                        b) 1  
c) +1                                      d) 0.5
- 8) If integration of the term  $1/x dx =$  \_\_\_\_\_.  
a)  $x$                                         b)  $1/x$   
c)  $X + C$                                 d)  $x - C$

08

- a) Define the terms
- Order of a reaction
  - Molecularity of a reaction
- b) Write the rate constant equation for first order reaction.
- c) For a straight line equation  $y = mx + C$ , sketch the nature of the graph.

- d) Write van der Waals equation and give the significance of the terms involved in it.
- e) Give the units for van der Waal's constant 'a' and 'b'.
- f) What do you mean by pseudo-unimolecular reaction? Give one example of this type.

**Q.3 Write short notes of the following questions. (Any Two)** **08**

- a) Causes for deviations of gases from the ideality
- b) Slope and its characteristics
- c) Intercept and its characteristics

**Q.4 Answer the following questions. (Any Two)** **08**

- a) What do you mean by second order reaction? Derive the expression for the rate constant for second order reaction where initial concentrations of the reactants are equal.
- 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) Calculate the critical constants  $P_c$  and of  $V_c$  of a given gas if the 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.

**Q.5 Answer of the following questions. (Any One)** **08**

- a) Mention various methods used for the determination of order of a chemical reaction. Describe any one of them in detail.
- b) What is an isotherm? Discuss Andrew's isotherm for carbon dioxide gas.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.2 Answer any four of the following. 08**
- a) Define Input Device?
  - b) Define Software?
  - c) Define taskbar?
  - d) What is Operating System?
  - e) What is File?
  - f) What is Mail-merge?
- Q.3 write short notes on any two of the following 08**
- a) Android
  - b) Secondary Storage
  - c) ROM and its types
- Q.4 Answer any Two of the following. 08**
- a) Explain Keyboard.
  - b) Explain Magnetic Tape with diagram.
  - c) Explain services of Operating System.
- Q.5 Answer any One of the following. 08**
- a) What are the environmental impacts of IT?
  - b) Write the features of MS-Word.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester – I) (Old) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Paper - II)**  
**Inorganic Chemistry**

Day &amp; Date: Wednesday, 25-01-2023

Max. Marks: 40

Time: 12:00 PM To 02:00 PM

- Instructions:** 1) All questions are compulsory.  
 2) Draw neat diagrams and give equations wherever necessary.  
 3) Figures to the right indicate full marks.  
 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 Choose correct alternatives from the options.****08**

- 1) Formation of dry ice is good example of \_\_\_\_\_.  
 a) Coordinate bond                      b) Hydrogen bond  
 c) Van der Waals attraction              d) Electrostatic force of attraction
- 2) In 1923, free electron theory was refined by \_\_\_\_\_.  
 a) Drude                                      b) Lorentz  
 c) Pauling                                      d) Lux
- 3) The shape of  $\text{PCl}_5$  molecule is \_\_\_\_\_.  
 a) Linear                                      b) Octahedral  
 c) Tetrahedral                              d) Trigonal bipyramidal
- 4) s-p bond is \_\_\_\_\_ than s-s bond.  
 a) weaker                                      b) stronger  
 c) neutral                                      d) None of these
- 5) The bond order of  $\text{C}_2$  molecule is \_\_\_\_\_.  
 a) one                                          b) two  
 c) three                                          d) four
- 6) NO is \_\_\_\_\_ molecule.  
 a) homonuclear diatomic                  b) heteronuclear diatomic  
 c) imaginary                                  d) non-existent
- 7) Among the halogen \_\_\_\_\_ is most reactive.  
 a) F                                              b) Cl  
 c) Br                                              d) I
- 8) Inert gas element have \_\_\_\_\_ electron affinity.  
 a) zero                                          b) high  
 c) low                                              d) medium

**Q.2 Answer the following questions. (Any Four)****08**

- 1) Define bonding and antibonding MOs.
- 2) Define bond order.
- 3) Draw MO diagram of  $\text{H}_2$  molecule.
- 4) What is hybridization?
- 5) Define  
 a) Metallic bond                              b) Hydrogen bond
- 6) What is ionization energy?

- Q.3 Answer the following questions. (Any Two)** **08**
- a) Shapes of d orbitals
  - b) Explain the formation of Ionic bond.
  - c) Explain formation of Be<sub>2</sub> molecule.
- Q.4 Answer the following questions (Any Two)** **08**
- a) Aufbau Principle
  - b) Explain the formation of SiCl<sub>4</sub> molecule
  - c) Distinguish between sigma bond and pi-bond.
- Q.5 Answer the following questions. (Any One)** **08**
- a) What is VSEPR theory? Explain the formation of H<sub>2</sub>O molecule on the basis of VSEPR theory.
  - b) Explain the structure of NaCl with respect to Radius ration, Unit cell, Co-ordination number and Stoichiometry.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.3 Write short notes. (Any Two)** **08**
- a) Pseudo code
  - b) Operators
  - c) Table of string
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Explain the structure of 'C' programming.
  - b) What is array? Explain the types of array.
  - c) Explain the features of 'C' language.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Write a program to display addition of two matrices.
  - b) How to declare string? Explain any two inbuilt string handling functions.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2022  
PHYSICS (Paper - I)**

**Mechanics and properties of matter**

Day & Date: Friday, 27-01-2023  
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 logarithmic tables and calculator is allowed.

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

**08**

- 1) Moment of inertia in rotational motion is analogous to the \_\_\_\_\_ in translation motion.
  - a) Momentum
  - b) Force
  - c) Acceleration
  - d) Mass
- 2) Moment of inertia of a spherical shell about its tangent is \_\_\_\_\_.
  - a)  $\frac{2}{3} MR^2$
  - b)  $\frac{7}{5} MR^2$
  - c)  $\frac{5}{3} MR^2$
  - d)  $MR^2$
- 3) The length of an equivalent simple pendulum of the compound pendulum is \_\_\_\_\_.
  - a)  $\frac{k^2}{l^2} + l$
  - b)  $\frac{k^2 + l^2}{2}$
  - c)  $\frac{k^2 + l^2}{l}$
  - d)  $k^2 + l^2$
- 4) The time period of compound pendulum is maximum when \_\_\_\_\_.
  - a)  $l = k$
  - b)  $l = 0$
  - c)  $l = 2k$
  - d)  $l = 3k$
- 5) The ratio of shearing stress to shearing strain is called \_\_\_\_\_.
  - a) Young's modulus
  - b) Bulk Modulus
  - c) Modulus of rigidity
  - d) Poisson's ratio
- 6) The C.G.S unit of surface tension is \_\_\_\_\_.
  - a) dyne.cm
  - b) dyne/cm<sup>2</sup>
  - c) dyne/cm
  - d) cm/dyne
- 7) Poiseuille's Capillary flow method is used to determine \_\_\_\_\_ of liquid.
  - a) Coefficient of viscosity
  - b) Surface tension
  - c) Density
  - d) Mass
- 8) Energy is dissipated more in \_\_\_\_\_ flow.
  - a) Streamline
  - b) Turbulent
  - c) Constricted
  - d) Steady

- Q.2 Answer the following questions. (Any Four) 08**
- a) Define moment of inertia.
  - b) Define center of suspension and center of oscillation.
  - c) Draw schematic diagram of Kater's Pendulum.
  - d) Define Poisson's ratio.
  - e) Define surface tension.
  - f) Find the length of equivalent simple pendulum of compound pendulum if radius of gyration is 25 cm.
- Q.3 Write short notes of the following questions. (Any Two) 08**
- a) Show the oscillations of compound pendulum perform simple harmonic motion.
  - b) Explain Jaeger's method to determine surface tension of a liquid.
  - c) Find the modulus of rigidity ( $\eta$ ) of a material for which  $K = 10 \times 10^{10} \frac{N}{m^2}$  and  $Y = 20 \times 10^{10} N/m^2$
- Q.4 Answer the following questions. (Any Two) 08**
- a) State and prove Bernoulli's theorem for the flow of liquids in pipes.
  - b) Show that shear strain is equivalent to compression strain and extension strain.
  - c) Find the difference of pressure between the two sides of the surface of a spherical drop of water of radius 0.6 mm. Surface tension of water is 0.075 N/m.
- Q.5 Answer the following questions. (Any One) 08**
- a) Derive an expression for M.I. of a spherical shell about one of its diameters.
  - b) Describe the Poiseuille's capillary flow method to determine the coefficient of viscosity of liquid.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Paper - I)**  
**Fundamentals of Microbiology**

Day & Date: Friday, 27-01-2023  
 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 labeled diagrams wherever necessary.

**Q.1 Choose the correct alternatives form options.**

**08**

- 1) Mycology is the study of \_\_\_\_\_ organisms.
  - a) Viruses
  - b) Fungi
  - c) Bacteria
  - d) Rickettsia
- 2) Genetic material of \_\_\_\_\_ organism is either DNA or RNA.
  - a) Bacteria
  - b) Viruses
  - c) Algae
  - d) Fungi
- 3) Peptidoglycan is a component of \_\_\_\_\_.
  - a) Flagella
  - b) Cell membrane
  - c) Cell wall
  - d) Capsule
- 4) Anti-phagocytosis is shown by \_\_\_\_\_ of organism.
  - a) Flagella
  - b) Cell wall
  - c) Cell membrane
  - d) Capsule
- 5) A group of similar species is \_\_\_\_\_.
  - a) Genus
  - b) Family
  - c) Order
  - d) Division
- 6) Rocky mountain spotted fever is caused by \_\_\_\_\_ organism.
  - a) Rickettsia
  - b) Actinomycetes
  - c) Protozoa
  - d) Archaeobacteria
- 7) Cells divide in one plane and remain attached predominantly in pairs are \_\_\_\_\_.
  - a) Streptococci
  - b) Tetrads
  - c) Diplococci
  - d) Staphylococci
- 8) \_\_\_\_\_ type of ribosomes is present in a eukaryotic cell.
  - a) 60S
  - b) 80S
  - c) 40 S
  - d) 70S

**Q.2 Answer the following questions (Any Four)**

**08**

- 1) Define Prokaryotes
- 2) Mention any four branches of Microbiology.
- 3) Define Genus.
- 4) Viroids
- 5) Function of flagella
- 6) List of any four beneficial activities of Microorganisms.

- Q.3 Write short notes. (Any Two)** **08**
- 1) Koch's postulates
  - 2) Cell membrane of bacteria
  - 3) Size, shape and arrangement of bacteria
- Q.4 Answer the following questions. (Any Two)** **08**
- 1) Give minimum four contributions of Louis Pastuer.
  - 2) General characteristics and economic importance of Actinomycetes.
  - 3) General principles of bacterial nomenclature.
- Q.5 Answer the following questions (Any One)** **08**
- a) Explain Spontaneous generation theory against biogenesis.
  - b) Draw a labeled diagram and explain the cell wall structure of Gram negative bacteria.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester – I) (Old) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper - II)**  
**Optics and Laser**

Day & Date: Saturday, 28-01-2023  
 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 logarithmic table and calculator is allowed.  
 4) Draw neat diagrams and give equations wherever necessary.

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

- 1) The rays that are incident on lens near edges of the lens are called as \_\_\_\_ rays.
  - a) Paraxial
  - b) Marginal
  - c) Co-axial
  - d) Axial
- 2) If there are 16000 lines per inch on grating then the grating element is \_\_\_\_\_.
  - a)  $1.5875 \times 10^{-3} \text{ cm}$
  - b)  $1.5875 \times 10^{-3} \text{ m}$
  - c)  $1.5875 \times 10^{-4} \text{ cm}$
  - d)  $1.5875 \times 10^{-4} \text{ m}$
- 3) The medium used in formation of LASER is called \_\_\_\_\_.
  - a) Electric
  - b) Active medium
  - c) Passive medium
  - d) Magnetic medium
- 4) The aberration due to lenses of large aperture is called as \_\_\_\_\_.
  - a) Chromatic
  - b) Lateral Chromatic
  - c) Longitudinal Chromatic
  - d) Spherical
- 5) The condition for achromatism is \_\_\_\_\_.
  - a)  $F_R = F_V$
  - b)  $F_R < F_V$
  - c)  $F_R > F_V$
  - d)  $F_R \pm F_V$
- 6) In Newton's rings experiment the distance between the successive rings \_\_\_\_\_ as the order of fringe 'n' increases.
  - a) Trends to infinity
  - b) Remains the same
  - c) Increase
  - d) Decreases
- 7) The condition for diffraction in Plane Diffraction Grating is \_\_\_\_\_.
  - a)  $d \sin \theta = n\lambda$
  - b)  $d \cos \theta = n\lambda$
  - c)  $d \tan \theta = n\lambda$
  - d)  $d \operatorname{cosec} \theta = n\lambda$
- 8) Gauss eyepiece is modification of \_\_\_\_\_.
  - a) Huygen's
  - b) Kellner's
  - c) Ramsden's
  - d) Nicol's

- Q.2 Answer the following questions. (Any Four)** **08**
- 1) What is Population inversion?
  - 2) Define Snell's law of refraction.
  - 3) Give the statement of Fermat's principle of extremum time.
  - 4) What do you mean by coherent sources?
  - 5) Draw neat labelled diagram of He-Ne LASER.
  - 6) What do you mean by grating element?
- Q.3 Write short notes. (Any Two)** **08**
- 1) Explain the application of Spectrometer to determine Refractive index of Prism.
  - 2) If the Dispersive Power of Prism is 0.044 and its focal length is 30cm, then calculate the longitudinal chromatic aberration of lens.
  - 3) Prove Snell's law of Refraction from Fermat's principle.
- Q.4 Answer the following questions (Any Two)** **08**
- 1) Define spherical aberration. Discuss any one method to minimize spherical aberration.
  - 2) The grating element of a Plane diffraction grating is  $1.640 \times 10^{-4}$ cm and the second order Principal Maxima is obtained at  $40^\circ$ . Calculate the unknown wavelength of the incident light.
  - 3) Compare Huygen's Eyepiece and Ramsden's Eyepiece.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Explain the construction and working of Ruby LASER.
  - b) Explain the theory of Newton's rings experiment. Derive an expression for  $n^{\text{th}}$  dark ring. In Newton's experiment the radius of curvature is 100cm, the diameter of 5<sup>th</sup> ring is 0.3cm and the diameter of 10<sup>th</sup> ring is 0.4cm. Calculate the wavelength of light used.

**P**

- Q.3 Write Short Notes. (Any two)** **08**
- a) Serial dilution technique
  - b) Cell wall staining
  - c) Living media
- Q.4 Write Short Notes. (Any Two)** **08**
- a) Selective media
  - b) Sterilization by phenolic compounds
  - c) Compare and contrast between compound and electron microscope.
- Q.5 Answer the following questions (Any One)** **08**
- a) Sterilization by physical agents
  - b) Gram staining

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Paper-I)**  
**Descriptive Statistics-I**

Day & Date: Monday, 30-01-2023  
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

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

**08**

- 1) In an exclusive type distribution, the limits excluded are
  - a) lower limits
  - b) upper limits
  - c) either of the lower or upper limit
  - d) lower limit and upper limit both
- 2) In a plot of frequencies against corresponding variate values, when successive points are smoothly joined we get
  - a) Density function
  - b) frequency polygon
  - c) frequency curve
  - d) ogive curve
- 3) If a constant 50 is subtracted from each observation of a set, the mean of the set is
  - a) increased by 50
  - b) decreased by 50
  - c) is not affected
  - d) zero
- 4) Geometric mean of two observations can be calculated only if
  - a) both the observations are positive
  - b) one of the observations is zero
  - c) one of them is negative
  - d) both of them are zero
- 5) Which one of the following is called as good measures of dispersion?
  - a) Range
  - b) Q.D.
  - c) M.D.
  - d) S.D.
- 6) Mean deviation is minimum when deviations are taken from
  - a) mean
  - b) median
  - c) mode
  - d) zero
- 7) The first order moment about origin is equal to
  - a) zero
  - b) one
  - c) three
  - d) mean
- 8) For any frequency distribution, second order moment about mean is
  - a) S.D.
  - b) Variance
  - c) C. V.
  - d) All of the above

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

**08**

- a) Define discrete variable and continuous variable.
- b) Define median and mode.
- c) Find A.M. and G.M of two observation 4 and 9
- d) Define any two relative measures of dispersion.
- e) Show that second central moment is variance.

- Q.3 Write short note on any two of the following:** **08**
- a) Explain the construction of histogram.
  - b) Show that mean square deviation is greater than or equal to variance.
  - c) What is the effect of change of origin and scale on arithmetic mean?
- Q.4 Answer any two of the following:** **08**
- a) Explain the construction of less than ogive curve.
  - b) Show that sum of deviations taken from mean is zero.
  - c) State and prove minimal property of mean square deviation.
- Q.5 Answer any two of the following:** **08**
- a) Derive the formula of median for grouped frequency distribution
  - b) Express first four central moments in terms of raw moments

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Paper - I)**  
**Animal Diversity I**

Day & Date: Monday, 30-01-2023  
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 diagram and give equations wherever necessary.

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

- 1) A Hydra can suddenly contract its body by the contraction of \_\_\_\_\_.  
a) Interstitial cells                      b) Musculoepithelial cell  
c) Nematostysts                          d) Digestive cells
- 2) In sponges spicules are formed by \_\_\_\_\_.  
a) Choanocytes                            b) Chromocytse  
c) Porocytes                                d) Scleroblasts
- 3) Earthworm belongs to class \_\_\_\_\_.  
a) Hirudinae                                b) Polychaeta  
c) Multichaeta                             d) Oligochaeta
- 4) Cephalothorax is found in \_\_\_\_\_.  
a) Porifera                                  b) Protozoa  
c) Arthropoda                              d) Mollusca
- 5) \_\_\_\_\_ class includes dentalium-elephant tusk shell.  
a) Gastropoda                              b) Cephalopoda  
c) Decapoda                                d) Scaphopoda
- 6) Haemocoel is characteristic of \_\_\_\_\_.  
a) Ascaris                                    b) Leech  
c) Cockroach                                d) Snail
- 7) \_\_\_\_\_ is connecting link of annelida and arthropoda.  
a) Peripatus                                b) Sphenodon  
c) Neries                                      d) Prawn
- 8) \_\_\_\_\_ is the locomotary organelle in mastigophera.  
a) Pseudopodia                            b) Cilia  
c) Flagella                                    d) Setae

**Q.2 Answer the following questions. (Any Four)** **08**

- 1) Diploblastic
- 2) Torsion
- 3) Ommatiidum
- 4) Binary fission
- 5) Economic importance of leech.
- 6) Classification of porifera upto class

- Q.3 Write short notes. (Any Two)** **08**
- 1) General characters of phylum Annelida.
  - 2) Water vascular system in Asteroidea.
  - 3) Economic importance of insects.
- Q.4 Answer the following questions. (Any Two)** **08**
- 1) Describe life cycle of tape worm
  - 2) Explain polymorphism in coelenterates
  - 3) Economic importance of molluscs.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Describe general characters and classification of phylum protozoa upto classes with examples.
  - b) Give an account of life cycle of *Ascaris lumbricoides*. Add note on parasitic adaptations.



**Seat  
No.**

## Max. Marks: 40

08

- Page 1 of 2

**Q.2 Answer the following question. (Any Four)**

- 1) Define finite sample space with example.
- 2) Define axiomatic definition of probability.
- 3) If  $A \subset B$  then prove that  $P(B|A) = 1$
- 4) Define partition of sample space.
- 5) Define probability mass function and distribution function.

**Q.3 Answer the following question. (Any Two)**

- 1) Which of the following functions, define a probability space on  $\Omega = \{w_1, w_2, w_3\}$ 
  - i)  $P(w_1) = \frac{1}{4}, P(w_2) = \frac{1}{3}, P(w_3) = \frac{1}{2}$
  - ii)  $P(w_1) = \frac{2}{3}, P(w_2) = -\frac{1}{3}, P(w_3) = \frac{2}{3}$
  - iii)  $P(w_1) = 0, P(w_2) = \frac{1}{3}, P(w_3) = \frac{2}{3}$
- 2) If A and B are mutually exclusive events, then show that
  - i)  $P(A/B) = 0$
  - ii)  $P(A/\bar{B}) = \frac{P(A)}{1 - P(B)}$
- 3) Verify whether the following functions can be regarded as the p.m.f. for the given values of X.
 
$$P(X = x) = \frac{3x + 2}{24} \quad x = 1, 2, 3$$

**Q.4 Answer the following question. (Any Two)**

- 1) State and prove addition law of probability for two events.
- 2) If A and B are independent events, show that  $A$  and  $\bar{B}$  are independent
- 3) A discrete random variable X has p.m.f.
 
$$P(X = x) = \frac{k2^x}{x!} \quad X = 0, 1, 2, 3, \dots$$
 Find
  - i) k
  - ii)  $P(1 \leq X \leq 3)$

**Q.5 Answer the following (Any One)**

- a) Prove that with usual notation
 
$$P(A \cup B/C) = P(A/C) + P(B/C) - P(A \cap B/C)$$
- b) The p. m. f. of random variable X is given by
 
$$P(X = x) = \frac{\binom{3}{x}}{8}, \quad x = 0, 1, 2, 3$$
  - i) Obtain probability distribution of X, hence the distribution function of X.
  - ii) Evaluate  $P(0 < X < 3)$  and  $P(X \geq 2)$ .

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Paper – II)**  
**Animal diversity – II**

Day & Date: Tuesday, 31-01-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All the 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 jaws are found
 

|               |              |
|---------------|--------------|
| a) Herdmania  | b) Fish      |
| c) Petromyzon | d) Amphioxus |
- 2) The petromyzon belongs to
 

|                   |                 |
|-------------------|-----------------|
| a) Chondrichthyes | b) Osteichthyes |
| c) Cyclostomata   | d) Amphibian    |
- 3) *Balanoglossus* belongs to
 

|                 |                    |
|-----------------|--------------------|
| a) Hemichordate | b) Cephalochordate |
| c) Urochordata  | d) Cyclostomata    |
- 4) Agnatha includes
 

|                 |                  |
|-----------------|------------------|
| a) Hag fishes   | b) Fishes        |
| c) Jelly fishes | d) Flying fishes |
- 5) Salamander belongs to the class
 

|             |              |
|-------------|--------------|
| a) Pisces   | b) Aves      |
| c) Reptiles | d) Amphibian |
- 6) Scientific name of king cobra is \_\_\_\_\_
 

|                       |                             |
|-----------------------|-----------------------------|
| a) <i>Naja naja</i>   | b) <i>Bungarus coerulus</i> |
| c) <i>Naja hunnah</i> | d) <i>Vipera russelli</i>   |
- 7) Turtles are
 

|               |             |
|---------------|-------------|
| a) Arthropods | b) Pisces   |
| c) Reptiles   | d) Molluscs |
- 8) Osteichthyes belongs to
 

|                    |                       |
|--------------------|-----------------------|
| a) Class amphibian | b) Super class pisces |
| c) Class tetrapoda | d) Division agnatha   |

- Q.2 Answer any four of the following. 08**
- a) General characters of Squamata.
  - b) Write a note on Falconiformes.
  - c) Write classification of Bat.
  - d) Enlist orders of Amphibia.
  - e) Give an account on Osteichthyes.
  - f) Write a note on agnatha.
- Q.3 Write short notes on any two of the following. 08**
- a) Discuss Parental care in amphibian with examples.
  - b) Explain Types of snake venom add a note on First aid treatment.
  - c) Give an account on General features of Protochordata.
- Q.4 Answer any Two of the following 08**
- a) Describe Venomous and non-poisonous snakes.
  - b) Give an account on Anseriformes with example.
  - c) Describe General features of Pisces.
- Q.5 Answer any one of the following. 08**
- a) Describe in detail general features and classification of mammals with examples.
  - b) Describe General Features and classification of reptiles with examples.

**Seat  
No.**

Day & Date: Wednesday, 01-02-2023  
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.

08

- 1) For any complex number  $z$ ,  $\sin(iz) =$  \_\_\_\_\_.
  - a)  $-i \sin hz$
  - b)  $i \sin hz$
  - c)  $i \sin h(-z)$
  - d) None of these
- 2) Period of  $\cosh(z)$  is \_\_\_\_\_.
  - a)  $2\pi$
  - b)  $3\pi$
  - c)  $3\pi i$
  - d)  $2\pi i$
- 3) If  $x + \frac{1}{x} = 2 \cos \theta$ , then  $x^r + \frac{1}{x^r} =$  \_\_\_\_\_.
  - a)  $\cos(2r\theta)$
  - b)  $2r \cos \theta$
  - c)  $r \cos 2\theta$
  - d)  $2 \cos(r\theta)$
- 4) Argand diagram states that geometrical representation of complex number is a point in the \_\_\_\_\_.
  - a) Sphere
  - b) Line
  - c) Pair of lines
  - d) Plane
- 5) Eigen vector of  $\begin{bmatrix} 1 & 6 \\ 5 & 2 \end{bmatrix}$  is \_\_\_\_\_.
  - a)  $\begin{bmatrix} -5 \\ 6 \end{bmatrix}$
  - b)  $\begin{bmatrix} 6 \\ -5 \end{bmatrix}$
  - c)  $\begin{bmatrix} 3 \\ -2 \end{bmatrix}$
  - d)  $\begin{bmatrix} -2 \\ 3 \end{bmatrix}$
- 6) The Eigen values of the matrix  $\begin{bmatrix} 1 & 2 & 3 \\ 0 & 2 & 5 \\ 0 & 0 & 3 \end{bmatrix}$  are \_\_\_\_\_.
  - a) 1, 2, 3
  - b) 0, 1, 2
  - c) 3, 5, 7
  - d) 0, 2, 5
- 7) The inverse of the matrix is  $\begin{bmatrix} 2 & 1 \\ 0 & 4 \end{bmatrix}$  is \_\_\_\_\_.
  - a)  $\begin{bmatrix} -1/2 & 1/8 \\ 0 & -1/4 \end{bmatrix}$
  - b)  $\begin{bmatrix} 1/2 & -1/8 \\ 0 & 1/4 \end{bmatrix}$
  - c)  $\begin{bmatrix} 1/2 & 0 \\ -1/8 & 1/4 \end{bmatrix}$
  - d)  $\begin{bmatrix} 1/2 & 0 \\ 1/8 & 1/4 \end{bmatrix}$

- 8)** The characteristic polynomial of the matrix  $\begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$  is \_\_\_\_.
- a)  $\lambda^3$ 
b)  $\lambda^2 + 5\lambda - 2$
- c)  $\lambda^2$ 
d)  $\lambda^2 - 5\lambda - 2$

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

08

- 1) If  $A$  is any square matrix then show that  $A - A'$  is a skew-symmetric matrix.
- 2) Define hyperbolic  $\cos$  and hyperbolic  $\sin$ .
- 3) If  $z$  is a complex number then prove that,  
 $\cos^2 z + \sin^2 z = 1$
- 4) Write the complex number  $\frac{1}{2} + \frac{\sqrt{3}}{2}i$  in terms of a polar form.
- 5) Find the Eigen values of the matrix  $\begin{bmatrix} 1 & 4 \\ 3 & 2 \end{bmatrix}$ .
- 6) Define the term normal form of a matrix.

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

08

- 1) Find rank of the following matrix  
$$\begin{bmatrix} 1 & 1 & 1 & 1 \\ 3 & 4 & 5 & 2 \\ 2 & 3 & 4 & 0 \end{bmatrix}$$
- 2) Solve the following linear non homogeneous equations if they are consistent.  $x + y + z = 6$ ,  $2x + y + 3z = 13$ ,  $5x + 2y + z = 12$ .
- 3) If  $z$  is any complex number then show that  
$$\cos^{-1} z = \log \left\{ z + \sqrt{z^2 - 1} \right\}$$

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

08

- 1) Prove that,  $\cos(z_1 + z_2) = \cos z_1 \cos z_2 - \sin z_1 \sin z_2$
- 2) If  $\sin(\alpha + i\beta) = x + iy$  then prove that,
  - a)  $\frac{x^2}{\cosh^2 \beta} + \frac{y^2}{\sinh^2 \beta} = 1$
  - b)  $\frac{x^2}{\sin^2 \alpha} - \frac{y^2}{\cos^2 \alpha} = 1$
- 3) Investigate for what values of  $\lambda$  and  $\mu$ , the following system of equations  
 $x + y + z = 6$   $x + 2y + 3z = 10$  ,  $x + 2y + \lambda z = \mu$   
will have
  - a) No solution
  - b) A unique solution
  - c) An infinity number of solutions

**Q.5 Answer the following questions. (Any One)**

08

- 1) State and prove De Moivre's theorem.
- 2) State Cayley-Hamilton's theorem and find  $A^{-1}$  for the matrix 
$$\begin{bmatrix} 2 & -1 & -1 \\ -1 & 2 & -1 \\ 1 & -1 & 2 \end{bmatrix}$$

| Set | P |
|-----|---|
| 1   | 1 |
| 2   | 1 |
| 3   | 1 |
| 4   | 1 |
| 5   | 1 |
| 6   | 1 |
| 7   | 1 |
| 8   | 1 |
| 9   | 1 |
| 10  | 1 |
| 11  | 1 |
| 12  | 1 |
| 13  | 1 |
| 14  | 1 |
| 15  | 1 |
| 16  | 1 |
| 17  | 1 |
| 18  | 1 |
| 19  | 1 |
| 20  | 1 |
| 21  | 1 |
| 22  | 1 |
| 23  | 1 |
| 24  | 1 |
| 25  | 1 |
| 26  | 1 |
| 27  | 1 |
| 28  | 1 |
| 29  | 1 |
| 30  | 1 |
| 31  | 1 |
| 32  | 1 |
| 33  | 1 |
| 34  | 1 |
| 35  | 1 |
| 36  | 1 |
| 37  | 1 |
| 38  | 1 |
| 39  | 1 |
| 40  | 1 |
| 41  | 1 |
| 42  | 1 |
| 43  | 1 |
| 44  | 1 |
| 45  | 1 |
| 46  | 1 |
| 47  | 1 |
| 48  | 1 |
| 49  | 1 |
| 50  | 1 |
| 51  | 1 |
| 52  | 1 |
| 53  | 1 |
| 54  | 1 |
| 55  | 1 |
| 56  | 1 |
| 57  | 1 |
| 58  | 1 |
| 59  | 1 |
| 60  | 1 |
| 61  | 1 |
| 62  | 1 |
| 63  | 1 |
| 64  | 1 |
| 65  | 1 |
| 66  | 1 |
| 67  | 1 |
| 68  | 1 |
| 69  | 1 |
| 70  | 1 |
| 71  | 1 |
| 72  | 1 |
| 73  | 1 |
| 74  | 1 |
| 75  | 1 |
| 76  | 1 |
| 77  | 1 |
| 78  | 1 |
| 79  | 1 |
| 80  | 1 |
| 81  | 1 |
| 82  | 1 |
| 83  | 1 |
| 84  | 1 |
| 85  | 1 |
| 86  | 1 |
| 87  | 1 |
| 88  | 1 |
| 89  | 1 |
| 90  | 1 |
| 91  | 1 |
| 92  | 1 |
| 93  | 1 |
| 94  | 1 |
| 95  | 1 |
| 96  | 1 |
| 97  | 1 |
| 98  | 1 |
| 99  | 1 |
| 100 | 1 |

Max. Marks: 40

08

08

- Q.3 Write short notes. (Any Two)** **08**
- 1) Classification of viruses
  - 2) Role of Algae in environment
  - 3) Importance of heterocyst in Nostoc
- Q.4 Answer the following questions. (Any Two)** **08**
- 1) Write general characters of Algae?
  - 2) What are the types of Life cycles in Algae?
  - 3) Explain Ultrastructure of Bacterial cell.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Explain Scalariform Conjugation in Spirogyra along with labeled diagrams.
  - b) Describe beneficial roles of bacteria.



|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.2 Answer any four of the following.** **08**
- Write any four indeterminate forms.
  - Find  $n^{\text{th}}$  derivative of  $y = \cos(ax + b)$ .
  - Define continuity of a function of two variables.
  - If  $u = x^3 - 3xy^2$  and  $V = 3x^2y - y^3$  then prove that  $\frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} = 0$ .
  - Define curl.
  - Find the value of  $\int_0^{\frac{\pi}{2}} \sin^{10}(x) \cdot dx$
- Q.3 Write short note on any two of the following** **08**
- Explain L' Hospital Rule.
  - Explain Geometrical Meaning of  $\nabla\phi$ .
  - If  $y = e^{ax} \sin(bx + c)$  then find  $y_n$ .
- Q.4 Answer any two of the following** **08**
- Find  $n^{\text{th}}$  derivative of  $y = x^3 \cdot e^x$
  - State and prove Euler's theorem on homogenous function.
  - Solve  $\int_0^2 x^5 (4 - x^2)^{3/2} dx$ .
- Q.5 Answer any one of the following.** **08**
- State and prove Leibnitz's Theorem.
  - Prove that  $\nabla^2(\log r) = \frac{1}{r^2}$ .

| Set | P |
|-----|---|
| 1   | 1 |
| 2   | 1 |
| 3   | 1 |
| 4   | 1 |
| 5   | 1 |
| 6   | 1 |
| 7   | 1 |
| 8   | 1 |
| 9   | 1 |
| 10  | 1 |
| 11  | 1 |
| 12  | 1 |
| 13  | 1 |
| 14  | 1 |
| 15  | 1 |
| 16  | 1 |
| 17  | 1 |
| 18  | 1 |
| 19  | 1 |
| 20  | 1 |
| 21  | 1 |
| 22  | 1 |
| 23  | 1 |
| 24  | 1 |
| 25  | 1 |
| 26  | 1 |
| 27  | 1 |
| 28  | 1 |
| 29  | 1 |
| 30  | 1 |
| 31  | 1 |
| 32  | 1 |
| 33  | 1 |
| 34  | 1 |
| 35  | 1 |
| 36  | 1 |
| 37  | 1 |
| 38  | 1 |
| 39  | 1 |
| 40  | 1 |
| 41  | 1 |
| 42  | 1 |
| 43  | 1 |
| 44  | 1 |
| 45  | 1 |
| 46  | 1 |
| 47  | 1 |
| 48  | 1 |
| 49  | 1 |
| 50  | 1 |
| 51  | 1 |
| 52  | 1 |
| 53  | 1 |
| 54  | 1 |
| 55  | 1 |
| 56  | 1 |
| 57  | 1 |
| 58  | 1 |
| 59  | 1 |
| 60  | 1 |
| 61  | 1 |
| 62  | 1 |
| 63  | 1 |
| 64  | 1 |
| 65  | 1 |
| 66  | 1 |
| 67  | 1 |
| 68  | 1 |
| 69  | 1 |
| 70  | 1 |
| 71  | 1 |
| 72  | 1 |
| 73  | 1 |
| 74  | 1 |
| 75  | 1 |
| 76  | 1 |
| 77  | 1 |
| 78  | 1 |
| 79  | 1 |
| 80  | 1 |
| 81  | 1 |
| 82  | 1 |
| 83  | 1 |
| 84  | 1 |
| 85  | 1 |
| 86  | 1 |
| 87  | 1 |
| 88  | 1 |
| 89  | 1 |
| 90  | 1 |
| 91  | 1 |
| 92  | 1 |
| 93  | 1 |
| 94  | 1 |
| 95  | 1 |
| 96  | 1 |
| 97  | 1 |
| 98  | 1 |
| 99  | 1 |
| 100 | 1 |

Max. Marks: 40

- Q.3 Write short notes. (Any Two)** **08**
- 1) Write general characters of Fungi.
  - 2) Explain roles of fungi in Biotechnology.
  - 3) Explain sporangiophores as asexual reproduction in mucor.
- Q.4 Answer the following questions. (Any Two)** **08**
- 1) Write short notes on vegetative reproduction in selaginella.
  - 2) Explain characters of archegoniates.
  - 3) Explain asexual reproduction in yeast with suitable diagram.
- Q.5 Answer the following questions. (Any One)** **08**
- a) State the economic importance of Gymnosperm.
  - b) Describe the antheridia and archegonia of Riccia.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov -2022  
ELECTRONICS (Paper - I)**

**Basic Circuit Theory and Network Analysis**

Day & Date: Tuesday, 28-03-2023  
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.  
4) Use of log table and calculator is allowed.

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

**08**

- 1) Parallel resonance circuit is also known as \_\_\_\_\_ circuit.
  - a) acceptor
  - b) rejector
  - c) high pass filter
  - d) low pass filter
- 2) In step up transformer \_\_\_\_\_.
  - a) no. of turns of primary winding are greater than no. of turns of secondary winding
  - b) no. of turns of secondary winding are greater than no. of turns of primary winding
  - c) no. of turns of primary winding are equal to no. of turns of secondary winding
  - d) any of the above
- 3) Impedance parameters are same as \_\_\_\_\_ circuit parameters.
  - a) short
  - b) closed
  - c) open
  - d) hybrid
- 4) Four capacitors of  $20 \mu f$  are connected in parallel, the equivalent capacitor is \_\_\_\_\_  $\mu f$ .
  - a) 100
  - b) 80
  - c) 60
  - d) 120
- 5) After applying Thevenin's theorem, equivalent circuit will have a new \_\_\_\_\_.
  - a) voltage source in series with resistance
  - b) current source in series with resistance
  - c) current source in parallel with resistance
  - d) voltage source in parallel with resistance
- 6) If the resistance of LCR series resonance circuit decreases then resonance frequency will \_\_\_\_\_.
  - a) Increases
  - b) decreases
  - c) remains same
  - d) none of these
- 7) The unit of reactance is \_\_\_\_\_.
  - a) ohm
  - b) mhos
  - c) henry
  - d) farad
- 8) A sinusoidal signal has maximum value of 20 A, its average value is \_\_\_\_\_.
  - a) 127.4 A
  - b) 0 A
  - c) 12.74 A
  - d) 1.274 A

- Q.2 Answer the following questions. (Any Four)** **08**
- a) Define active and passive network.
  - b) An oscilloscope shows 5 cycles of sine wave in  $10\mu$  sec. Calculate time period and frequency.
  - c) Define resonance frequency and band width.
  - d) Write color code of  $1K\Omega$  resistance with 10% tolerance.
  - e) Give the classification of capacitor.
- Q.3 Write short note on any two of the following.** **08**
- a) Maximum power transfer theorem
  - b) T network
  - c) Constant current and voltage source
- Q.4 Answer any two of the following.** **08**
- a) Obtain Hybrid parameters for two port network net work.
  - b) Explain mesh analysis for dc resistive circuit.
  - c) Explain construction and working principle of step-down transformer.
- Q.5 Answer any one of the following.** **08**
- a) What is resistor? Give its classification. Explain carbon resistor with color codes.
  - b) Explain series RLC resonance circuit. Derive expression for resonance frequency and quality factor.

| Seat No. |  |
|----------|--|
|----------|--|

- Q.4 Answer the following questions. (Any Two)** **08**
- a) What is Folding? Explain any four types of folding?
  - b) What is Geomorphology? Explain the nature of geomorphology.
  - c) Explain the Interior of the Earth.
- Q.5 Answer the following questions. (Any One)** **08**
- a) What is rock? Explain the types of rock.
  - b) What is the destructive effect of earthquake?



|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Paper – I)**  
**Physical Geology**

Day & Date: Tuesday, 28-03-2023  
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 labeled diagrams wherever necessary.

### Q.1 Multiple choice questions.

08

- 1) Material accumulated from surface down to solid rock including soil is called \_\_\_\_\_.  
a) Tors  
b) Murum  
c) Regolith  
d) Talus
- 2) Formation of soil depends upon \_\_\_\_\_ factor.  
a) Parent material  
b) Time  
c) Climate and land forms  
d) All of these
- 3) The Nebular hypothesis put forward by \_\_\_\_\_.  
a) Chamberlin  
b) Kant  
c) Kant and Laplace  
d) Chamberlin and Moulton
- 4) \_\_\_\_\_ discontinuity separate core from mantle.  
a) Mohorovicic  
b) Conrad  
c) Moho  
d) Gutenberg
- 5) Earthquake wave is also called as \_\_\_\_\_ wave.  
a) Seismic  
b) Sound  
c) Light  
d) None of these
- 6) Second most abundant gas released from volcano is \_\_\_\_\_.  
a) CO<sub>2</sub>  
b) Water vapour  
c) Sulphur  
d) None of these
- 7) The highest density of atmosphere occurs at \_\_\_\_\_.  
a) Troposphere  
b) Thermosphere  
c) Stratosphere  
d) Mesosphere
- 8) Average radius of the earth is \_\_\_\_\_ gm/cm<sup>3</sup>.  
a) 5654  
b) 6371  
c) 7413  
d) 6555

**Q.2 Answer the following questions. (Any Four)**

08

- Rotation and revolution of Earth
- Asthanosphere
- Define focus and epicenter.
- Define weathering.
- What is Sima?

**Q.3 Write short notes. (Any Two)**

08

- a)** Seismic waves  
**b)** Product of volcano  
**c)** Seismograph

**Q.4 Answer the following questions. (Any Two)**

**08**

- a) Explain the planetismal theory of earth origin.
- b) Describe fissure type of volcanos.
- c) Describe causes of earthquake.

**Q.5 Answer the following questions. (Any One)**

**08**

- a) Describe physical types of weathering.
- b) Describe the earth interior.

**Seat  
No.**

## Max. Marks: 40

08

- 08

- Page 1 of 2

- Q.3 Write short notes on the following. (Any Two)** **08**
- 1) Full adder using basic gates
  - 2) Unweighted codes
  - 3) Controlled inverter
- Q.4 Answer the following questions. (Any Two)** **08**
- 1) State and Prove De' Morgan's Theorem.
  - 2) Explain parallel binary adder.
  - 3) Explain rules and laws of Boolean algebra.
- Q.5 Answer the following questions. (Any One)** **08**
- 1) Explain hexadecimal number system. Convert hexadecimal number  $(D4)_{16}$  into its equivalent Binary, Octal and Decimal number.
  - 2) Why NOR / NAND gate is called as Universal Building Block? Construct basic gates by using NAND gate.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - I) (Old) (CBCS) Examination: Oct/Nov - 2022**  
**GEOGRAPHY (Paper - II)**  
**Geomorphology-II**

Day & Date: Monday, 27-03-2022  
 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 labeled diagrams wherever necessary.  
 4) Use of maps and stencils allowed.

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

- 1) \_\_\_\_\_ means the change of rocks from the massive to the classic state.
  - a) Earthquake
  - b) Erosion
  - c) Mass Movement
  - d) Weathering
- 2) Oxidation is \_\_\_\_\_ type of weathering.
  - a) Biological
  - b) Physical
  - c) Chemical
  - d) None of these
- 3) \_\_\_\_\_ is erosional landform of Glaciers.
  - a) Horns
  - b) Pot Holes
  - c) Deltas
  - d) Waterfall
- 4) \_\_\_\_\_ is a function of structure, process and time.
  - a) Landscape
  - b) Volcano
  - c) Earthquake
  - d) None of these
- 5) \_\_\_\_\_ is depositional landform of Glaciers.
  - a) Ox-Bow-Lake
  - b) Barkhan
  - c) Alluvial Cones
  - d) Eskers
- 6) Barkhan is the depositional landforms made by \_\_\_\_\_.
  - a) Glacier
  - b) Ocean waves
  - c) Wind
  - d) River
- 7) \_\_\_\_\_ landform is formed due to erosional work of wind.
  - a) Rapids
  - b) Delta
  - c) Yardang
  - d) Waterfall
- 8) The process of disintegration and decomposition of rocks is called as \_\_\_\_\_.
  - a) Transportation
  - b) Denudation
  - c) Weathering
  - d) Erosion

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

- 1) What is erosion?
- 2) What is weathering?
- 3) What is Mass movement?
- 4) What is Flood Plain?
- 5) What is U shaped valley?
- 6) What is Kettle?

- Q.3 Write short notes on any two of the followings . 08**
- 1) Trio of Devis
  - 2) V shaped Valley
  - 3) Drumlins
- Q.4 Attempt any two of the following questions. 08**
- 1) Erosional landforms of river
  - 2) Depositional landforms of sea wave
  - 3) Explain the agents of weathering.
- Q.5 Attempt any one of the following questions. 08**
- 1) Explain the Erosional landforms of Aeolian.
  - 2) Explain the depositional landform of Glacier.

**Seat  
No.**

## Max. Marks: 40

08

- 08

- 08

**Q.4 Answer the following. (Any Two)****08**

- a) Describe horst and graben.
- b) Describe genetic classification of joints.
- c) Describe use of contour in geologic and topographic maps.

**Q.5 Answer the following. (Any One)****08**

- a) What is fold? Describe any three types of fold.
- b) Define unconformity? Describe various types of unconformities.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**ENGLISH (Compulsory)**  
**Literary Voyage**

Day &amp; Date: Tuesday, 07-02-2023

Max. Marks: 40

Time: 12:00 PM To 02:00 PM

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

**Q.1 Rewrite the following by choosing the correct option given below each bit. 08**

- 1) According to Francis Bacon, in discourse \_\_\_\_\_ must be used carefully and economically.
  - a) Fire
  - b) Wit
  - c) Weapons
  - d) Gadgets
- 2) Bertrand Russell was against the \_\_\_\_\_ learning.
  - a) Practical
  - b) Experimental
  - c) Bookish
  - d) Experiential
- 3) "The Spirit of Freedom" was actually \_\_\_\_\_ written by Tagore from America for Indians.
  - a) A poem
  - b) A letter
  - c) A song
  - d) A gazal
- 4) Niyi Osundare is basically \_\_\_\_\_ about the regeneration of the deteriorating earth.
  - a) Hopeful
  - b) Hopeless
  - c) Pessimistic
  - d) Without hope
- 5) Christina Rossetti didn't want her lover to be \_\_\_\_\_ remembering her.
  - a) happy
  - b) sad
  - c) pleased
  - d) blissful
- 6) The synonym of 'accountable' is \_\_\_\_\_.
  - a) hopeless
  - b) responsible
  - c) rich
  - d) economical
- 7) The antonym of 'objective' is \_\_\_\_\_.
  - a) critical
  - b) actual
  - c) subjective
  - d) factful
- 8) I saw a cuckoo, when I \_\_\_\_\_ the window of the room.
  - a) opening
  - b) opens
  - c) open
  - d) opened

**Q.2 Answer the following questions briefly. (Any Four) 12**

- a) What subjects should be kept away from jest according to Bacon?
- b) What did Bertrand Russell as a schoolboy know about the squirrels?
- c) What was condition of freedom in a nation like America?
- d) How is water pollution depicted in "Our Earth Will Not Die"?
- e) What was Alexander Pope's source of comfort?
- f) Why did Christina Rossetti allow her lover to forget her?

**Q.3** a) Write an informal letter addressing your friend and inviting him to spend the Diwali vacation with you and your family. **10**

**OR**

b) Describe the process of making tea. Use the instructions beginning from the initial preparation for making tea up to serving the tea.

**Q.4** Write a presentation on the topic “India and Democracy” by preparing slides on the basis of the following data: **10**

- a) India’s freedom struggle
- b) Indian freedom fighters
- c) India’s independence
- d) Indian constitution
- e) Democracy
- f) India as a nation
- g) Place of India in the world
- h) Future of India

**Seat  
No.**

Day & Date: Wednesday, 08-02-2023  
Time: 12:00 PM To 02:00 PM

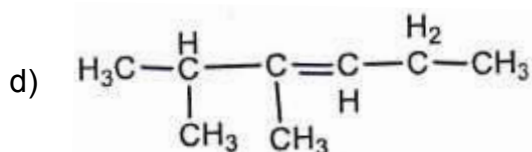
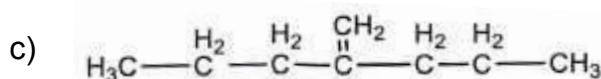
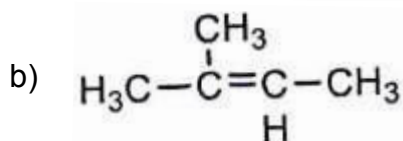
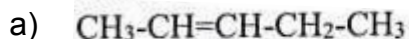
**Instructions:** 1) All questions are compulsory.  
2) Draw neat diagrams and give equations wherever necessary.  
3) Figures to the right indicates full marks.  
4) Use of logarithmic table and calculator is allowed.  
(At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

08

- 1) The intermediate species obtained by the homolytic fission of a covalent bond are \_\_\_\_\_.  
a) Carbocations  
b) Carbanions  
c) Free radicals  
d) Carbenes
- 2) Nitrenes are \_\_\_\_\_.  
a) Monovalent  
b) Divalent  
c) Trivalent  
d) None of the above
- 3) The hybridization of carbon involved in acetylene is \_\_\_\_\_.  
a)  $sp^3$   
b)  $sp^2$   
c)  $sp$   
d) None of the above
- 4) Saturated alicyclic (aliphatic cyclic) hydrocarbons are known as \_\_\_\_\_.  
a) Cycloalkane  
b) nedoalkane  
c) all of the above  
d) aromatic alkane
- 5) Which of the following is not a nucleophile  
a)  $BF_3$   
b)  $H_2O$   
c)  $CH_3OH$   
d)  $NH_3$
- 6) Carbocations are \_\_\_\_\_.  
a) Electron rich  
b) Neutral  
c) Electron deficient  
d) None of the above
- 7) Molecule that are having non-superimposable mirror image relationship are \_\_\_\_\_.  
a) Chiral  
b) Achiral  
c) Symmetric  
d) None of the above
- 8) Benzene contains \_\_\_\_\_ number of  $\pi$  electrons?  
a) 3  
b) 6  
c) 4  
d) 0

**Q.2 Answer the following questions. (Any Four)**

- 1) What are cycloalkanes give general formula of cycloalkanes.
- 2) What is asymmetric carbon atom? Give one example.
- 3) Give IUPAC names for the following



- 4) What are carbocations? Give any two methods of formation of carbocations.
- 5) What are cycloalkanes? Give the general formula of cycloalkanes.
- 6) Define the term hybridization. Give the type of the hybridization and shapes of the following compounds  
a)  $\text{CH}_4$    b)  $\text{C}_2\text{H}_4$    c)  $\text{C}_2\text{H}_2$

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

08

- 1) Explain  $\text{SP}$  hybridization with respect to acetylene.
- 2) What are dienes? Give their general formula.
- 3) What is plane polarised light? Explain optical inactivity in meso compounds.

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

08

- 1) What are carbanions? Give any two methods of formation of carbanions.
- 2) What is optical activity? Discuss optical isomerism of 2,3-dihydroxy butanoic acid.
- 3) Explain and illustrate  $\text{SP}^3$ ,  $\text{SP}^2$  and  $\text{SP}$  hybridization.

**Q.5 Answer any ONE of the following.**

08

- a) What are alkynes? Give the general formula of alkyne and explain how hydrogen atoms in acetylene are acidic.
- b) Explain the structure of benzene on the basis of molecular orbital theory.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper-III)**  
**Introduction to Web Designing**

Day & Date: Wednesday, 08-02-2023  
 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 alternatives from the options. 08**

- 1) HTML stands for \_\_\_\_\_.  
 a) Hyper Tech Markup Language    b) Hyper Text Markup Language  
 c) Hyper Text Makeup Language    d) None of these
- 2) JavaScript is not case sensitive language.  
 a) True    b) False
- 3) \_\_\_\_\_ HTML tag produces the biggest heading.  
 a) <h7>    b) <h9>  
 c) <h4>    d) <h1>
- 4) HTML tags are surrounded by which type of brackets?  
 a) Angle    b) Round  
 c) Square    d) Curly
- 5) Which of the following is not a pair tag?  
 a) <p>    b) <u>  
 c) <i>    d) <br>
- 6) What does CSS stand for?  
 a) Creative Style Sheets    b) Cascading Style Sheets  
 c) Colorful Style Sheets    d) Computer Style Sheets
- 7) \_\_\_\_\_ is the father of HTML.  
 a) Tim Berners-Lee    b) Hack on lee  
 c) Tim Thompson    d) none of these
- 8) The declaration in CSS consists \_\_\_\_\_.  
 a) selector    b) property  
 c) values    d) all of these

**Q.2 Answer Any Four of the following: 08**

- a) Explain date function in JavaScript.
- b) What is singular and paired tag?
- c) Define selector.
- d) Explain bus topology with diagram.
- e) What is image floating?
- f) Define opacity.

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

- a) Animation In CSS
- b) Anchor Tag
- c) Box model using CSS

**Q.4 Answer any Two of the following.**

**08**

- a) What is HTML? Explain Text Formatting Tag with example.
- b) Explain for loop and while loop with example in Java script.
- c) Explain different types of computer networking.

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

**08**

- a) Write the advantages of CSS.
- b) Explain table tag and its attributes with example in HTML.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov- 2022**  
**CHEMISTRY (Paper-IV)**  
**Analytical Chemistry**

Day & Date: Thursday, 09-02-2023  
 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) The parachor is \_\_\_\_\_ property.
  - a) Additive
  - b) Constitutive
  - c) Both additive and constitutive
  - d) None of these
- 2) The unit of surface tension is \_\_\_\_\_.
  - a) dyne cm
  - b) dyne cm<sup>-1</sup>
  - c) dyne<sup>-1</sup> cm
  - d) dyne<sup>-1</sup> cm<sup>-1</sup>
- 3) \_\_\_\_\_ is very essential for plant life and is not a direct pollutant.
  - a) CO
  - b) CO<sub>2</sub>
  - c) NO
  - d) SO<sub>2</sub>
- 4) Cl<sub>2</sub> + H<sub>2</sub>O = \_\_\_\_\_.
  - a) HOCl + HCl
  - b) HOCl<sub>2</sub>
  - c) HCl + HCl
  - d) HCl
- 5) Filtration usually removes \_\_\_\_\_ impurity in water.
  - a) Colloidal
  - b) bacterial
  - c) dissolved salt
  - d) dissolved gaseous
- 6) In combustion method for the detection of hydrogen, hydrogen of the organic compound get oxidized to \_\_\_\_\_.
  - a) H<sub>2</sub>
  - b) H<sub>2</sub>O
  - c) CO<sub>2</sub>
  - d) Both b and c
- 7) Carbon and hydrogen are estimated by \_\_\_\_\_.
  - a) Liebig's method
  - b) Carius method
  - c) Kjeldal's methode
  - d) None of these
- 8) Which of the following substance is used as an anti-knock compound?
  - a) tetraethyl lead
  - b) lead tetrachloride
  - c) lead acetate
  - d) Lead Nitrate

**Q.2 Answer the following questions. (Any Four)****08**

- 1) Explain the term Parachor.
- 2) Comment on quality parameters of water.
- 3) What are the environmental effects of CO and CO<sub>2</sub>?
- 4) What are the parameters of potability of water?
- 5) How are carbon and hydrogen detected?
- 6) What is refining of petroleum?

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

- 1) What is air pollution? Comment on types of air pollutants.
- 2) Give in detail Carius method for the estimation of chlorine in an organic compound.
- 3) What is refining? Give the details of different constitution obtained from petroleum refining.

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

- 1) Define dipole moment. Discuss the application of dipole moments in the determination of structures of molecules.
- 2) Discuss the types of water pollutant.
- 3) Write note on:
  - i) Detection of carbon and hydrogen.
  - ii) Quantitative analysis of nitrogen by Kjeldahl's method.

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

- a) Write note on:
  - 1) Additive and constitutive properties.
  - 2) Specific and molecular refractivities.
  - 3) Refractivity index and Snell's law.
- b) Explain in detail ion exchange method.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper – IV)**  
**Programming Using C - II**

Day & Date: Thursday, 09-02-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

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

- 1) Passing parameters to \_\_\_\_\_ function is called as “command line” arguments.
  - a) main()
  - b) getch()
  - c) clrscr( )
  - d) getchar()
- 2) \_\_\_\_\_ keyword is useful to give alternative name for exiting data type.
  - a) sizeof
  - b) int
  - c) char
  - d) typedef
- 3) \_\_\_\_\_ is used as a dynamic memory allocation function.
  - a) release()
  - b) realloc()
  - c) fprintf()
  - d) None of these
- 4) \_\_\_\_\_ function is used to write single integer value into file.
  - a) putc()
  - b) get()
  - c) putw()
  - d) getw()
- 5) By default ‘C’ function returns \_\_\_\_\_ type value.
  - a) char
  - b) int
  - c) float
  - d) double
- 6) \_\_\_\_\_ give the color of specified pixel.
  - a) get pixel()
  - b) put pixel()
  - c) Both a & b
  - d) None of these
- 7) \_\_\_\_\_ draws the pixel with specified color.
  - a) get pixel()
  - b) put pixel()
  - c) Both a & b
  - d) None of these
- 8) \_\_\_\_\_ operator used along with pointer to dereference it.
  - a) &
  - b) \*
  - c) →
  - d) Both b & c

**Q.2 Answer the following questions. (Any Four)****08**

- 1) Define Union.
- 2) What is macro?
- 3) How to initialize pointer?
- 4) What is preprocessor?
- 5) Define local & global variable.
- 6) What is structure?

- Q.3 Write short note on any two of the following.** **08**
- a) Command line arguments
  - b) Recursion
  - c) Nested structure
- Q.4 Answer any two of the following.** **08**
- a) Define file and explain how to open and close the file.
  - b) Explain pointer of pointer in details.
  - c) Write a program to display 5 records of students using structure.
- Q.5 Answer any one of the following.** **08**
- a) Write a program to show difference between structure & union.
  - b) What is Dynamic memory allocation? Explain in details.

Set P

Max. Marks: 40

08

08

- 5) Find efficiency of Carnot's engine working between  $107^{\circ}$  Celsius and  $17^{\circ}$  Celsius.
- 6) Define the terms:
  - a) Isothermal process &
  - b) Adiabatic process, and give its equation for change in entropy

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

- 1) Work done during and isothermal process
- 2) Summer air conditioning system
- 3) Comparison between auto engine and diesel engine

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

- 1) Explain how viscosity of gas depends upon temperature and pressure.
- 2) State and explain zeroth law of thermodynamics.
- 3) A Carnot's engine working as a refrigerator between 260K and 300K receives 500 calories of heat from the reservoir at the higher temperature. Calculate the amount of work done in each cycle to operate the refrigerator.  
(1 Calorie = 4.2J).

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

- 1) With a neat labelled diagram explain working of vapor compression refrigeration system.
- 2) Show that  $PV^{\gamma} = \text{constant}$  for adiabatic process.



- Q.3 Write short notes on any two of the following. 08**
- 1) Structure of t-RNA
  - 2) Lock & Key hypothesis
  - 3) Autotrophs
- Q.4 Answer any two of the following question. 08**
- 1) EMP pathway
  - 2) Indicators of culture media
  - 3) Constitutive & Induced enzymes
- Q.5 Answer any one of the following questions. 08**
- 1) TCA cycle
  - 2) Structure and function of proteins

| Set | P |
|-----|---|
| 1   | 1 |
| 2   | 1 |
| 3   | 1 |
| 4   | 1 |
| 5   | 1 |
| 6   | 1 |
| 7   | 1 |
| 8   | 1 |
| 9   | 1 |
| 10  | 1 |
| 11  | 1 |
| 12  | 1 |
| 13  | 1 |
| 14  | 1 |
| 15  | 1 |
| 16  | 1 |
| 17  | 1 |
| 18  | 1 |
| 19  | 1 |
| 20  | 1 |
| 21  | 1 |
| 22  | 1 |
| 23  | 1 |
| 24  | 1 |
| 25  | 1 |
| 26  | 1 |
| 27  | 1 |
| 28  | 1 |
| 29  | 1 |
| 30  | 1 |
| 31  | 1 |
| 32  | 1 |
| 33  | 1 |
| 34  | 1 |
| 35  | 1 |
| 36  | 1 |
| 37  | 1 |
| 38  | 1 |
| 39  | 1 |
| 40  | 1 |
| 41  | 1 |
| 42  | 1 |
| 43  | 1 |
| 44  | 1 |
| 45  | 1 |
| 46  | 1 |
| 47  | 1 |
| 48  | 1 |
| 49  | 1 |
| 50  | 1 |
| 51  | 1 |
| 52  | 1 |
| 53  | 1 |
| 54  | 1 |
| 55  | 1 |
| 56  | 1 |
| 57  | 1 |
| 58  | 1 |
| 59  | 1 |
| 60  | 1 |
| 61  | 1 |
| 62  | 1 |
| 63  | 1 |
| 64  | 1 |
| 65  | 1 |
| 66  | 1 |
| 67  | 1 |
| 68  | 1 |
| 69  | 1 |
| 70  | 1 |
| 71  | 1 |
| 72  | 1 |
| 73  | 1 |
| 74  | 1 |
| 75  | 1 |
| 76  | 1 |
| 77  | 1 |
| 78  | 1 |
| 79  | 1 |
| 80  | 1 |
| 81  | 1 |
| 82  | 1 |
| 83  | 1 |
| 84  | 1 |
| 85  | 1 |
| 86  | 1 |
| 87  | 1 |
| 88  | 1 |
| 89  | 1 |
| 90  | 1 |
| 91  | 1 |
| 92  | 1 |
| 93  | 1 |
| 94  | 1 |
| 95  | 1 |
| 96  | 1 |
| 97  | 1 |
| 98  | 1 |
| 99  | 1 |
| 100 | 1 |

Max. Marks: 40

08

08

- Q.3 Write Short Notes. (Any Two)** **08**
- a) Explain the series LCR resonance circuit and derive the expression for resonant frequency.
  - b) What is damping in Ballistic Galvanometer? Explain how the damping is corrected.
  - c) Explain the working of Zener diode as a Voltage Regulator.
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Derive the expression for growth of current in a circuit containing inductance (L) and resistance (R) circuit connected to source of e.m.f. E in series.
  - b) Explain the working of Owen's Bridge.
  - c) Figure of merit of a ballistic galvanometer is  $5 \times 10^{-7} \mu\text{A/mm}$ . The resistance of Ballistic galvanometer is 100 ohm. Calculate the current sensitivity and voltage sensitivity.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Obtain an expression for the magnetic induction at a point on the axis of current carrying straight solenoid of finite length.
  - b) Explain transistor characteristics in common emitter mode.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Paper – IV)**  
**Applied Microbiology**

Day & Date: Saturday, 11-02-2023

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.

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

- 1) Kovac's reagent is used for \_\_\_\_\_ test.
  - a) Methyl red
  - b) Indole
  - c) Voges Proskauer
  - d) Citrate
- 2) Study of causative agent, spread, diagnosis of disease is called \_\_\_\_\_.
  - a) Epidemiology
  - b) Prophylaxis
  - c) Prevention
  - d) Virulence
- 3) In HTST method of pasteurization milk is heated at \_\_\_\_\_ temperature for 15 seconds.
  - a) 62.8°C
  - b) 71.7°C
  - c) 140°C
  - d) 200°C
- 4) Efficiency of pasteurization is determined by \_\_\_\_\_ test.
  - a) Phosphatase
  - b) MBRT
  - c) DMC
  - d) SPC
- 5) \_\_\_\_\_ is used for disinfection of water.
  - a) Chlorine
  - b) HCl
  - c) NaCl
  - d) NaOH
- 6) \_\_\_\_\_ is used to determine the strength of sewage.
  - a) BOD
  - b) MPN
  - c) MBRT
  - d) Phosphatase
- 7) \_\_\_\_\_ is air borne disease.
  - a) Cholera
  - b) Dysentery
  - c) Typhoid
  - d) Tuberculosis
- 8) In anaerobic digestion of sewage major gas produced is \_\_\_\_\_.
  - a) CH<sub>4</sub>
  - b) CO<sub>2</sub>
  - c) SO<sub>2</sub>
  - d) O<sub>2</sub>

**Q.2 Answer Any Four of the following: 08**

- 1) Nosocomial infection
- 2) Types of sewage (Enlist)
- 3) Define: BOD
- 4) Define: Virulence
- 5) Indicators of Faecal pollution
- 6) Give the composition of milk

- Q.3 Write short notes on any Two of the following. 08**
- a) Sources of microorganisms in water
  - b) Imhoff's tank
  - c) Prophylactic measures for airborne diseases
- Q.4 Answer any two of the following. 08**
- a) Describe MPN test.
  - b) Describe the types of infections.
  - c) Describe MBRT test for milk.
- Q.5 Answer any one of the following. 08**
- a) Describe the secondary method for sewage treatment.
  - b) Describe the method of transmission of diseases.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov - 2022**  
**STATISTICS (Paper - III)**  
**Descriptive Statistics – II**

Day & Date: Monday, 13-02-2023  
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

**Instructions:** 1) All the 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.****08**

- 1) Regression coefficient is independent of change of
  - a) Origin
  - b) scale
  - c) Both origin & scale
  - d) None of these
- 2) If  $byx = 0.4$  and  $bxy = 0.9$  then the correlation coefficient (r) is
  - a) 0.36
  - b) 0.6
  - c) - 0.36
  - d) - 0.6
- 3) Total number of class frequencies of all order for 'n' attributes is
  - a)  $3^n$
  - b)  $2^n$
  - c)  $2^n - 1$
  - d)  $2n$
- 4) If  $\text{Cov}(X, Y) = 50$  then  $\text{Cov}(10X + 10, 5Y + 5)$  is
  - a) 50
  - b) 2000
  - c) 2500
  - d) 500
- 5) If the variables are uncorrelated then the regression lines are
  - a) Parallel
  - b) Coincident
  - c) Perpendicular
  - d) None of these
- 6) The G.M. of Laspeyre's and Paasche's indices is
  - a) Marshall-Edgeworth index
  - b) Walsch index
  - c) Fisher's index
  - d) None of these
- 7) If the variables X and Y change in opposite direction then the correlation coefficient (r) is
  - a) Zero
  - b) Positive
  - c) Negative
  - d) One
- 8) If one of the regression coefficients is positive then the other must be
  - a) Positive
  - b) Negative
  - c) Zero
  - d) None of these

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

- a) Define a fundamental set of class frequencies with an illustration.
- b) Define Laspeyre's price index number.
- c) With usual notations, show that  $bxy * byx \leq 1$ .
- d) Define Fisher's price index number.
- e) Describe Scatter diagram.

- f) Define Spearman's rank correlation coefficient.

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

- a) Regression coefficients
- b) Properties of correlation coefficient
- c) Cost of living index number

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

- a) Explain with an example the effect of change of origin & scale on correlation coefficient.
- b) What is time reversal test? Verify it for Fisher's price index number.
- c) Explain the concepts of independence and association of two attributes.

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

- a) Derive acute angle between two lines of regression.
- b) With usual notation prove that  $Q = \frac{2Y}{(1+Y^2)}$

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov - 2022**  
**ZOOLOGY (Paper – III)**  
**Comparative Anatomy of Vertebrates**

Day &amp; Date: Monday, 13-02-2023

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 and labeled diagram wherever necessary.

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

- 1) \_\_\_\_\_ are the characters of hoofed mammals.
 

|          |            |
|----------|------------|
| a) Horns | b) canines |
| c) hairs | d) nails   |
- 2) Pelvic girdle is \_\_\_\_\_ shaped.
 

|      |      |
|------|------|
| a) W | b) L |
| c) N | d) V |
- 3) \_\_\_\_\_ is a digestive gland.
 

|              |            |
|--------------|------------|
| a) Pituitary | b) Pineal  |
| c) Pancreas  | d) Thyroid |
- 4) Gills are only found in \_\_\_\_\_ animals.
 

|            |            |
|------------|------------|
| a) calotes | b) sparrow |
| c) cobra   | d) tadpole |
- 5) Four chambered heart is found in \_\_\_\_\_.
 

|         |              |
|---------|--------------|
| a) rat  | b) fish      |
| c) frog | d) crocodile |
- 6) Seminiferous tubules are present in \_\_\_\_\_.
 

|           |            |
|-----------|------------|
| a) kidney | b) liver   |
| c) testis | d) stomach |
- 7) Brain is divided into main \_\_\_\_\_ parts.
 

|         |          |
|---------|----------|
| a) two  | b) four  |
| c) five | d) three |
- 8) Function of optic lobe is sense of \_\_\_\_\_.
 

|            |              |
|------------|--------------|
| a) sight   | b) digestion |
| c) balance | d) hearing   |

**Q.2 Answer Any Four of the following:** **08**

- a) Which are the epidermal glands in vertebrates?
- b) Describe different types of horns in mamma.
- c) Describe different types of feathers in birds.
- d) Describe pectoral girdle of rabbit.
- e) Explain types of tongue in reptiles.
- f) Describe the different types of scales in pisces.

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

- a) Describe pectoral girdles of Frog.
- b) Describe digestive glands and its functions.
- c) Give an account of lungs of birds.

- Q.4 Answer any Two of the following.** **08**
- a) Describe the aortic arches in mammals.
  - b) Write notes on various types of gills in fishes.
  - c) Describe structure and function of mammalian heart.
- Q.5 Answer any One of the following.** **08**
- a) Describe detail structure and functions of brain of vertebrates.
  - b) Describe in detail structure and functions of kidneys in vertebrates.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov - 2022**  
**STATISTIC (Paper – IV)**  
**Probability and Probability Distributions - II**

Day & Date: Tuesday, 14-02-2023  
 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 a) Choose correct alternative.****08**

- 1) For a discrete r. v.  $X$ , the second moment about mean is called, second \_\_\_\_\_ moment.
  - a) raw
  - b) factorial
  - c) central
  - d) None of these
- 2) If  $X$  and  $Y$  are independent r. v. s then \_\_\_\_\_.
  - a)  $E(X + Y) = E(X) + E(Y)$
  - b)  $E(X \cdot Y) = E(X) \cdot E(Y)$
  - c)  $P(x, y) = P(x) \cdot P(y)$
  - d) all of these
- 3) If  $X$  and  $Y$  are two independent r.v.s then  $v(x - y) =$  \_\_\_\_\_.
  - a)  $v(x) + v(y) - 2 \text{ cov}(x, y)$
  - b)  $v(x) + v(y) + 2 \text{ cov}(x, y)$
  - c)  $v(x) + v(y)$
  - d)  $v(x) - v(y)$
- 4) The p.m.f. of one point distribution is \_\_\_\_\_.
  - a)  $P(X = 1) = K$
  - b)  $P(X = K) = 1$
  - c)  $P(X = K) = \frac{1}{2}$
  - d)  $P\left(X = \frac{1}{2}\right) = 0$
- 5) If  $X_1, X_2, \dots, X_n$  are independent and identically distributed Bernoulli r. v.s then the distribution of  $Y = \sum_{i=1}^n X_i$  is \_\_\_\_\_.
  - a) Bernoulli
  - b) discrete uniform
  - c) hypergeometric
  - d) binomial
- 6) If  $P(x) = \frac{1}{5} \quad x = 10, 20, 30, 40, 50$   
 $= 0 \quad \text{otherwise}$   
 then the distribution of r.v.  $X$  is identical to \_\_\_\_\_ Distribution.
  - a) discrete uniform
  - b) Binomial
  - c) hypergeometric
  - d) two point
- 7) Suppose a box contains 4 white and 6 black balls. Three balls are drawn randomly without replacement. A r.v.  $X$  is defined as number of white balls obtained. Then probability distribution of r.v.  $X$  is identical to \_\_\_\_\_ distribution.
  - a) Bernoulli
  - b) binomial
  - c) hypergeometric
  - d) none of these
- 8) The probability generating function of Bernoulli distribution is \_\_\_\_\_.
  - a)  $(s + pq)$
  - b)  $(p + qs)$
  - c)  $(p + s + q)$
  - d)  $(q + ps)$

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

- Define expectation of function of r. v.  $X$
- Define second factorial moment.
- If  $X$  and  $Y$  are two discrete r. vs. and  $a$  and  $b$  are any constants, then in usual notations state the expression for
  - $E(aX + bY)$
  - $V(aX + bY)$
- State the pmf of hypergeometric distribution with parameters  $N, M$  and  $n$  in usual notation.
- Define Bernoulli random variable.

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

08

- State and prove the recurrence relation for probabilities of binomial distribution.
- With usual notation prove that  $V(aX + b) = a^2 V(X)$
- The joint pmf of r. v.  $(X, Y)$  is
 
$$P(x, y) = \begin{cases} \frac{1}{4} & x = 1, 2; y = 1, 2 \\ 0 & \text{otherwise} \end{cases}$$
 Discuss the independence of  $X$  and  $Y$

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

08

- A r. v.  $X$  has following probability distribution
 

|         |               |               |                |                |
|---------|---------------|---------------|----------------|----------------|
| $X:$    | 0             | 1             | 2              | 3              |
| $P(x):$ | $\frac{1}{6}$ | $\frac{1}{2}$ | $\frac{3}{10}$ | $\frac{1}{30}$ |

 Find  $E(X)$  and  $V(X)$ .
- Define two point distribution and find its mean.
- Derive and identify the distribution of sum of independent and identically distributed 'n' Bernoulli random variables.

**Q.5 Answer any two of the following:**

08

- The joint probability distribution of r. v.  $(X, Y)$  is

| $\begin{matrix} Y \backslash X \\ \hline \end{matrix}$ | 0             | 1             | 2             |
|--------------------------------------------------------|---------------|---------------|---------------|
| 0                                                      | $\frac{1}{9}$ | $\frac{2}{9}$ | 0             |
| 1                                                      | 0             | $\frac{2}{9}$ | $\frac{1}{9}$ |
| 2                                                      | $\frac{1}{9}$ | 0             | $\frac{2}{9}$ |

Find  $E(X/Y = 2)$ 

- Find mean and variance of binomial distribution.



**Seat  
No.**

Day & Date: Tuesday, 14-02-2023  
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.

08

- 1) Megalecithal egg is characteristics of \_\_\_\_\_.  
a) Reptiles  
b) Amphibians  
c) Herdmania  
d) Human
- 2) In frog sperm enters through \_\_\_\_\_.  
a) Animal pole  
b) Vegital pole  
c) Grey crescent  
d) Jelly layer
- 3) In mammals fertilization takes place in \_\_\_\_\_.  
a) Cervix  
b) Fallopian Tube  
c) Vagina  
d) Both a and b
- 4) In mammals blastula is known as \_\_\_\_\_.  
a) Blastocyst  
b) Blastocoel  
c) Blastopore  
d) Stereoblastula
- 5) \_\_\_\_\_ twins physically connected to each other.  
a) Conjoined  
b) Identical  
c) Dizygotic  
d) Mirror image twins
- 6) In frog during metamorphosis degeneration of internal gills and gill silts indicates \_\_\_\_\_ change.  
a) Hormonal  
b) External  
c) Internal  
d) Both a and c
- 7) Syndesmo placenta found in \_\_\_\_\_.  
a) Cattles  
b) Man  
c) Dog  
d) Bear
- 8) \_\_\_\_\_ is used for detection of abnormalities of foetus.  
a) Doppler ultrasound  
b) 3D Ultrasound  
c) MRI Scan  
d) Radio labelling

08

- Define vitellogenesis.
- Syndesmo chorial placenta.
- Define cleavage.
- Cortical Reaction
- Spawning
- What is Involution? Give example.

08

- What is miscarriage? Write causes of miscarriage.
- Functions of placenta
- Describe role of MPF in oocyte maturation.

**Q.4 Answer any Two of the following.**

**08**

- a) Significance of metamorphosis in frog
- b) Describe Dizygotic twins.
- c) Principle and applications of ultrasound

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

**08**

- a) Describe extrinsic pathway of Apoptosis. Add a note on examples of Apoptosis.
- b) Describe fate of three germ layers in frog.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov -2022**  
**MATHEMATICS PAPER-III**  
**Geometry**

Day & Date: Wednesday, 15-02-2023  
 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 the coordinate axes are rotated through an angle and  $\theta$  about the origin, then the transformation equations are \_\_\_\_\_
 

|                                          |                                          |
|------------------------------------------|------------------------------------------|
| a) $x = x' \cos \theta + y' \sin \theta$ | b) $x = x' \cos \theta - y' \sin \theta$ |
| $y = x' \sin \theta + y' \cos \theta$    | $y = x' \sin \theta + y' \cos \theta$    |
| c) $x = x' \sin \theta - y' \cos \theta$ | d) $x = x' \sin \theta + y' \cos \theta$ |
| $y = x' \cos \theta + y' \sin \theta$    | $y = x' \cos \theta + y' \sin \theta$    |
- 2) The polar form of Cartesian equation  $x^2 + y^2 = 4ax$  is \_\_\_\_
 

|                         |                         |
|-------------------------|-------------------------|
| a) $r = 2a \sin \theta$ | b) $r = 2a \cos \theta$ |
| c) $r = 4a \sin \theta$ | d) $r = 4a \cos \theta$ |
- 3) The Cartesian coordinates of point are  $(\sqrt{3}, 1)$  then it's polar coordinates are \_\_\_\_
 

|                    |                    |
|--------------------|--------------------|
| a) $(2, 60^\circ)$ | b) $(2, 90^\circ)$ |
| c) $(2, 30^\circ)$ | d) $(2, 45^\circ)$ |
- 4) The general second degree equation  $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$  represents hyperbola if and only if \_\_\_\_
 

|                                  |                                  |
|----------------------------------|----------------------------------|
| a) $\Delta \neq 0, h^2 - ab < 0$ | b) $\Delta \neq 0, h^2 - ab = 0$ |
| c) $\Delta \neq 0, h^2 - ab > 0$ | d) $\Delta \neq 0, a = b, h = 0$ |
- 5) Angle between the two planes  $2x - y + z = 6$  and  $x + y + 2z = 7$  is \_\_\_\_
 

|                    |                    |
|--------------------|--------------------|
| a) $\frac{\pi}{2}$ | b) $\frac{\pi}{3}$ |
| c) $\frac{\pi}{4}$ | d) $\frac{\pi}{6}$ |
- 6) The distance of the plane  $2x - 6y + 3z - 28 = 0$  from the origin  $O(0,0)$  is \_\_\_\_
 

|      |      |
|------|------|
| a) 1 | b) 2 |
| c) 3 | d) 4 |
- 7) The centre of the sphere  $x^2 + y^2 + z^2 - 4x - 6y + 8z + 4 = 0$  is \_\_\_\_
 

|                  |                   |
|------------------|-------------------|
| a) $(2, 3, 4)$   | b) $(2, 3, -4)$   |
| c) $(-2, -3, 4)$ | d) $(-2, -3, -4)$ |
- 8) The equation of tangent plane to the sphere  $x^2 + y^2 + z^2 = 14$  at the point  $(1, 2, 3)$  is \_\_\_\_
 

|                       |                       |
|-----------------------|-----------------------|
| a) $x - 2y + 3z = 14$ | b) $x + 2y - 3z = 14$ |
| c) $x + 2y + 3z = 14$ | d) $x - 2y - 3z = 14$ |

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

- a) If the origin  $O(0, 0)$  is shifted to a point  $O'(1, -2)$  keeping the axes parallel to the old axes, then find the new equation of  $2x^2 + y^2 - 4x + 4y = 0$
- b) Write the transformation equations if the coordinate axes are rotated through an angle  $30^\circ$  about origin.
- c) Identify the conic given by the equation  $x^2 + 2xy + y^2 - 2x - 1 = 0$
- d) Find the intercepts of the plane  $2x - 3y + 4z = 12$  on the coordinate axes.
- e) Obtain the equation of the sphere whose diameter has extremities  $(3, 4, -2)$  and  $(-2, -1, 0)$
- f) Find the centre and radius of the sphere  $x^2 + y^2 + z^2 + 2x - 4y - 6z + 5 = 0$

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

- a) If coordinate axes are rotated through an angle  $\theta$  about the origin  $O(0,0)$  the expression  $ax^2 + 2hxy + by^2$  transforms into  $a'x'^2 + b'y'^2$  then prove that  $\theta = \frac{1}{2} \tan^{-1} \left( \frac{2h}{a-b} \right)$
- b) Find the equation of the plane through the points  $A(2, 2, -1)$ ,  $B(3, 4, 2)$  and  $C(7, 0, 6)$
- c) Find the equation of tangent plane at  $(1, 2, -3)$  to the sphere  $x^2 + y^2 + z^2 - x + 2y + 3z = 8$

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

- a) Transform the equation  $x^2 - y^2 = a^2$  when the axes are rotated through an angle  $45^\circ$  about origin  $O(0, 0)$
- b) Show that the general equation of the first degree in  $x, y, z$  represents a plane.
- c) Obtain the condition of tangency that the plane  $Ax + By + Cz = D$  touches to the sphere  $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$

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

- a) If axes are rotated through an angle  $\theta$  about origin  $O(0, 0)$  the expression  $ax^2 + 2hxy + by^2$  transforms into  $a'x'^2 + 2h'x'y' + b'y'^2$  then  $a + b$  and  $ab - h^2$  are invariants.
- b) i) Find the equation of the plane passing through the line of intersection of the planes  $x + y + z = 6$  and  $2x + 3y + 4z + 5 = 0$ , and also pass through the point  $(1, 1, 1)$   
 ii) Find the equation of the sphere through the circle  $x^2 + y^2 + z^2 + 2x + 3y + 6 = 0$ ,  $x - 2y + 4z - 9 = 0$  and the centre of the sphere  $x^2 + y^2 + z^2 - 2x + 4y - 6z + 5 = 0$

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov -2022**  
**BOTANY (Paper-III)**  
**Plant Ecology**

Day & Date: Wednesday, 15-02-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ is an important climatic factor.
 

|            |                 |
|------------|-----------------|
| a) Water   | b) Wind         |
| c) Soil pH | d) Soil texture |
- 2) \_\_\_\_\_ is the quantitative character of the community.
 

|              |                   |
|--------------|-------------------|
| a) Density   | b) Abundance      |
| c) Phenology | d) Stratification |
- 3) The \_\_\_\_\_ is biotic component of an ecosystem.
 

|             |             |
|-------------|-------------|
| a) producer | b) sunlight |
| c) water    | d) calcium  |
- 4) The \_\_\_\_\_ is the submerged hydrophyte.
 

|                    |                   |
|--------------------|-------------------|
| a) <i>Pistia</i>   | b) <i>Typha</i>   |
| c) <i>Hydrilla</i> | d) <i>Cyperus</i> |
- 5) The floating stage of hydrosere is represented by \_\_\_\_\_.
 

|                    |                    |
|--------------------|--------------------|
| a) <i>Hydrilla</i> | b) <i>Chara</i>    |
| c) <i>Typha</i>    | d) <i>Nymphaea</i> |
- 6) The base of ecological pyramid is always represented by \_\_\_\_\_.
 

|              |                |
|--------------|----------------|
| a) Predators | b) Producers   |
| c) Consumers | d) Decomposers |
- 7) \_\_\_\_\_ is the first stage of Xerosere.
 

|                          |                         |
|--------------------------|-------------------------|
| a) Crustose lichen stage | b) Foliose lichen stage |
| c) Moss stage            | d) Climax               |
- 8) \_\_\_\_\_ is found in Xerophytes.
 

|                           |                             |
|---------------------------|-----------------------------|
| a) Air chamber            | b) Single layered epidermis |
| c) Multilayered epidermis | d) Mucilage                 |

**Q.2 Answer the following questions. (Any Four)**

**08**

- a) Define primary and secondary succession.
- b) What is an Ecosystem? Enlist abiotic factors.
- c) What are hydrophytes? Enlist the types of it.
- d) Define food chain and food web.
- e) Define heliophytes and sciophytes.
- f) Define ecological adaptation

- Q.3 Write short notes. (Any Two)** **08**
- a) Hydric adaptations.
  - b) Detritus food chain.
  - c) Biotic components of ecosystem.
- Q.4 Answer of the following questions. (Any Two)** **08**
- a) Define Xerophytes. State the morphological and anatomical adaptations in it.
  - b) What is ecological succession? Describe various successional stages of hydrosere.
  - c) Describe important quantitative characters of the community.
- Q.5 Answer of the following questions. (Any One)** **08**
- a) What is the ecological pyramid? Explain pyramid of number and biomass with suitable examples.
  - b) Give an account of process of plant succession.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|       |
|-------|
| Set P |
|-------|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov - 2022**  
**Mathematics (Paper – IV)**  
**DIFFERENTIAL EQUATIONS**

Day & Date: Thursday, 16-02-2023  
 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 calculator and logarithmic table is allowed.

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

**08**

- 1) The solution of  $\tan x \, dx + \cot y \, dy = 0$  is \_\_\_\_\_.
  - a)  $\cos x \cdot \sin y = C$
  - b)  $-\sec x \sin y = C$
  - c)  $\sec x \cdot \cos y = C$
  - d)  $\sec x \cdot \sin y = C$
- 2) The homogeneous differential equation  $Mdx + Ndy = 0$  can be reduced to variable separable type by using the substitution \_\_\_\_\_.
  - a)  $y = vx$
  - b)  $x \cdot y = v$
  - c)  $x - y = v$
  - d) None of these
- 3) The linear differential equation  $\frac{dx}{dy} + Px = Q$  where  $P$  and  $Q$  are functions of  $y$  alone can be reduced to exact by multiplying a suitable factor \_\_\_\_\_.
  - a)  $e^{\int P dx}$
  - b)  $e^{\int Q dx}$
  - c)  $e^{\int Q dy}$
  - d)  $e^{\int P dy}$
- 4) The integrating factor of the differential equation  $ydx - xdy = 0$  is/are \_\_\_\_\_.
  - a)  $\frac{1}{xy}$
  - b)  $\frac{1}{x^2}$
  - c)  $\frac{1}{y^2}$
  - d) All the above
- 5) The solution of  $(D^2 - 1)y = 0$  is \_\_\_\_\_.
  - a)  $(c_1 + c_2x)e^x$
  - b)  $(c_1 + c_2x)e^{-x}$
  - c)  $c_1e^x + c_2e^{-x}$
  - d) None of these.
- 6) The equation  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = 0$  has C.F. \_\_\_\_\_.
  - a)  $(c_1 + c_2x)e^{2x}$
  - b)  $c_1e^{2x} + c_2e^{-2x}$
  - c)  $(c_1 + c_2x)e^{-2x}$
  - d)  $(c_1 + c_2x)e^x$
- 7)  $\frac{\sin ax}{D^2 + a^2} =$  \_\_\_\_\_.
  - a)  $-\frac{x}{2a} \cdot \frac{1}{4a^2} \sin ax$
  - b)  $-\frac{x^2}{2a} \cos ax$
  - c)  $-\frac{x}{2a} \cos ax$
  - d)  $\frac{x}{2a} \sin ax$

8)  $\frac{1}{D^2} x^2 = \underline{\hspace{2cm}}$

a)  $\frac{x^4}{12}$

b)  $\frac{x^3}{3}$

c)  $\frac{x^2}{3}$

d) None of these

**Q.2 Attempt any four from the following.**

**08**

1) Find the particular integral for the differential equation

$$\frac{d^2 y}{dx^2} - 9y = e^{-3x} + 1 + e^{3x}$$

2) Solve :  $(D^3 - 1)y = 0$

3) Find the complementary function for  $(D^4 + 10D^2 + 9)y = \cos^2 x$

4) Solve :  $(e^y + 1) \cos x \, dx + e^y \sin x \, dy = 0$

5) Solve the exact differential equation  $(1 + 6y^2 - 3x^2 y) \frac{dy}{dx} = 3x y^2 - x^2$

6) Solve  $\frac{dy}{dx} + \frac{4x}{1+x^2} y = \frac{1}{(x^2+1)^3}$

**Q.3 Attempt any two from the following.**

**08**

a) With usual notations prove that

$$\frac{1}{f(D)} e^{ax} = \frac{1}{f(a)} e^{ax}, \text{ if } f(a) \neq 0$$

b) Solve the non homogeneous differential equation

$$(2x + 4y + 3) \frac{dy}{dx} = (2y + x + 1)$$

c) Solve:  $(D^3 - D^2 - 6D)y = x^2 + \sin x$

**Q.4 Attempt any two from the following.**

**08**

a) Define homogeneous differential equation and explain how they can be solve.

b) Show that

$$(D - \alpha)(D - \beta)y = (D - \beta)(D - \alpha)y$$

$$\text{Where } D = \frac{d}{dx}$$

c) Solve:  $\frac{d^2 y}{dx^2} - 5 \frac{dy}{dx} + 6y = \cos 3x + e^{4x}$

**Q.5 Attempt any one form the following**

**08**

a) With usual notations, prove that

$$\frac{1}{f(D^2)} \cos ax = \frac{1}{f(-a^2)} \cos ax, \text{ if } f(-a^2) \neq 0 \text{ and hence solve}$$

$$D^2(D^2 + 9)y = \cos 3x$$

b) Define linear differential equation of first order and explain how they can be solved and hence solve

$$\frac{dy}{dx} + \frac{n}{x} y = \frac{a}{x^n}$$



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov - 2022**  
**BOTANY (Paper – IV)**  
**Taxonomy of Angiosperm**

Day & Date: Thursday, 16-02-2023

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.

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

- 1) Standard size of herbarium sheet is \_\_\_\_\_ cm.  
a) 25x41                                      b) 29x50  
c) 29x41                                      d) 30x45
- 2) A group of genus collected to form next higher unit called \_\_\_\_\_.  
a) order                                        b) family  
c) genus                                        d) species
- 3) In the floral formula C () stands for \_\_\_\_\_.  
a) corolla united                              b) calyx united  
c) stamens united                             d) carpels united
- 4) Suffix of order ends with \_\_\_\_\_.  
a) -ales                                        b) -ae  
c) -ceae                                        d) -ieae
- 5) The leaves of tobacco plant contain \_\_\_\_\_ alkaloids.  
a) papaverine                                b) aconitine  
c) pyridine                                    d) nicotine
- 6) *Gloriosa superba* belongs to family \_\_\_\_\_.  
a) Caesalpinaceae                            b) Solanaceae  
c) Nyctaginaceae                            d) Liliaceae
- 7) The rules for naming the plants are framed by \_\_\_\_\_.  
a) ICICI                                        b) ICBN  
c) ISRO                                        d) IDBI
- 8) Fresh herbarium specimen made after publication, if holotype is missing called \_\_\_\_\_.  
a) isotype                                      b) syntype  
c) lectotype                                    d) neotype

**Q.2 Answer Any Four of the following:** **08**

- Give merits of Bentham and Hookers system of classification.
- Define isotype.
- Economic importance of potato plant.
- Write classification with reason of family Caesalpiniaceae.
- Define herbarium.
- Comment on arboretum.

- Q.3 Write short notes on any Two of the following. 08**
- a) Aims and principles of Taxonomy.
  - b) Distinguishing characters of family Solanaceae.
  - c) Significance of botanical garden.
- Q.4 Answer any Two of the following. 08**
- a) Give principles of ICBN.
  - b) Explain in brief the lead botanical garden of Shivaji university Kolhapur.
  - c) Give reproductive character (floral character) of family Nyctaginaceae.
- Q.5 Answer any One of the following. 08**
- a) Assigning any two of the given plant to their respective families giving reasons and give their economic uses.
    - 1) *Withaniasomnifera*
    - 2) *Alliumcepa*
    - 3) *Tamarindusindica*
  - b) What is nomenclature? Describe binomial nomenclature of plant.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov - 2022**  
**ELECTRONICS (Paper – III)**  
**Semiconductor Devices**

Day & Date: Friday, 17-02-2023  
 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 diagram wherever necessary.  
 4) Use of log table and calculator is allowed.

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

**08**

- 1) In intrinsic semiconductor fermi energy level \_\_\_\_\_.  
 a) lies at the centre of C.B and V.B  
 b) lies above valance band  
 c) lies below conduction band  
 d) absent
- 2) \_\_\_\_\_ diode is used as voltage regulator.  
 a) LED  
 b) Zener  
 c) Varactor  
 d) Tunnel
- 3) In Common emitter configuration of  $BJT$   $\beta = 99$  therefore  $\alpha =$  \_\_\_\_\_.  
 a) 0.90  
 b) 0.96  
 c) 0.99  
 d) 0.89
- 4) In P channel JFET current is conducted by \_\_\_\_\_.  
 a) only electrons  
 b) both electronics and holes  
 c) any charges  
 d) only holes
- 5) In n type semiconductor negative charge concentration is \_\_\_\_\_ than positive charge concentration.  
 a) more  
 b) less  
 c) equal to  
 d) none
- 6) Photo diode is always used in \_\_\_\_\_ biased mode.  
 a) forward  
 b) reversed  
 c) both a) and b)  
 d) none
- 7) BJT is \_\_\_\_\_ controlled device.  
 a) voltage  
 b) field  
 c) current  
 d) power
- 8) \_\_\_\_\_ is unidirectional device.  
 a) Diac  
 b) triac  
 c) SBS  
 d) SCR

**Q.2 Answer the following questions. (Any Four)**

**08**

- a) What is semiconductor? What are its types?
- b) Define static and dynamic resistance of p n junction diode.
- c) Define current gain  $\alpha$  and  $\beta$  in case of BJT.
- d) Give any four differentiating points between FET and BJT.
- e) Give classification of power devices.

- Q.3 Write short notes. (Any Two)** **08**
- a) construction of Diac
  - b) Working of P channel FET
  - c) Light emitting diode
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Explain IV characteristics of UJT.
  - b) Explain construction of PN junction Diode.
  - c) Explain biasing modes of BJT.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Define all FET parameters and derive relation between them.
  - b) Explain N type of semiconductor in detail.

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICAL GEOGRAPHY (Paper – III)**  
**Human Geography I**

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.

08

- The book 'Anthropogeography' written by \_\_\_\_\_.  
a) Humboldt                      b) Miss Semple  
c) Blache                         d) Ratzel
- People engaged in activities \_\_\_\_\_ are called red-collar workers.  
a) Primary                        b) Secondary  
c) Tertiary                       d) Quaternary
- \_\_\_\_\_ is the sub branch of social geography.  
a) Transport geography          b) Agriculture geography  
c) Population geography        d) Marketing geography
- \_\_\_\_\_ has discovered blood groups in the world.  
a) Charles Darwin                b) Landsteiner  
c) William Davis                 d) Jems Hutton
- Griffith Taylor classified races of the world into \_\_\_\_\_ groups.  
a) Five                              b) Six  
c) Seven                            d) Eight
- \_\_\_\_\_ is worlds most populated and most widely distributed religion.  
a) Islam                              b) Christian  
c) Hindu                             d) Buddha
- Buddh Gaya and Sarnath are the important holy places of \_\_\_\_\_ religion.  
a) Hindu                              b) Islam  
c) Buddha                          d) Christian
- Mecca and Madina are the important holy places of \_\_\_\_\_ religion.  
a) Islam                              b) Buddha  
c) Hindu                              d) Christian

08

- State the any two characteristics of Jainism.
- Any Two Physical Characteristics of Eskimo.
- State the region of the Negrito.
- What is human geography?
- Define race.
- Scientific nature of human geography.

08

- Importance of Human geography.
- Characteristics of Christianity.
- Economy of Nagas.

**Q.4 Answer any Two of the following.**

**08**

- a) Types of Economic activities.
- b) State the Characteristics of Sikhism.
- c) Racial Classification.

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

**08**

- a) Explain the Griffith Taylor's theory of human race.
- b) Explain the various language families in the world.

|  |
|--|
|  |
|--|

**Q.4 Answer any Two of the following.**

**08**

- a) Describe the tetragonal crystal system.
- b) Describe the form of beryl type of hexagonal system.
- c) Describe the forms of barite types in orthorhombic system.

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

**08**

- a) Describe monoclinic crystal system.
- b) Describe the crystallographic axes of each crystal system.



**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**ELECTRONICS (Paper-IV)**  
**Digital Electronics**

Max. Marks: 40

08

- 1) The fan out of TTL device is \_\_\_\_\_.  
a) 10  
b) 20  
c) 30  
d) 40
- 2) \_\_\_\_\_ number of control lines used in 8:1 Multiplexer.  
a) 1  
b) 2  
c) 3  
d) 4
- 3) T flip flop is a \_\_\_\_\_ flip-flop.  
a) Triggered  
b) Timed  
c) Toggle  
d) None of these
- 4) SISO Shift register means \_\_\_\_\_.  
a) Serial In Standard Out  
b) Standard In Serial Out  
c) Standard In Standard Out  
d) Serial In Serial Out
- 5) Mod 10 counter requires minimum \_\_\_\_\_ flip-flops.  
a) 3  
b) 4  
c) 5  
d) 6
- 6) IC \_\_\_\_\_ is used as multiplexer.  
a) 74138  
b) 74153  
c) 74147  
d) 74193
- 7) A four bit ring counter requires \_\_\_\_\_ number of flip-flops.  
a) 2  
b) 3  
c) 4  
d) 8
- 8) IC 7490 is used as \_\_\_\_\_.  
a) decade counter  
b) flip-flop  
c) multiplexer  
d) none of these

08

- Define propagation delay time in TTL.
- Draw diagram of 4:1 Multiplexer.
- Mention various types of Flip-flops.
- Enlist types of shift registers.
- What is ring counter?
- What is asynchronous counter?

- Q.3 Write short notes on any Two of the following. 08**
- a) RS flip-flop using NOR gates.
  - b) TTL NAND gate
  - c) Ring counter
- Q.4 Answer any Two of the following. 08**
- a) Explain BCD to Decimal decoder.
  - b) Explain IC7490 as divide by 10 counter.
  - c) Explain JK flipflop.
- Q.5 Answer any One of the following. 08**
- a) Explain Four bit asynchronous binary counter.
  - b) Explain 1:8 demultiplexer with suitable diagram.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICAL GEOGRAPHY (Paper – IV)**  
**Human Geography – II**

Day & Date: Monday, 20-02-2023  
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

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

- 1) A group of houses/ huts built by man himself or group of human beings for permanent or temporary shelter purpose, is known as \_\_\_\_\_.  
 a) Industrialization                      b) settlement  
 c) agriculture                              d) None of them
- 2) \_\_\_\_\_ is a type of agriculture which involves both crops and livestock.  
 a) Mixed                                      b) commercial grain  
 c) shifting                                    d) Mediterranean
- 3) Rubber, tea, coffee, sugarcane are the main cash crops of \_\_\_\_\_ agriculture.  
 a) mixed                                      b) commercial grain  
 c) shifting                                    d) plantation
- 4) Whenever the houses are aligned along the sides of a road, railway line, river, canal or valley, then it is known as \_\_\_\_\_ pattern.  
 a) linear                                      b) checker board  
 c) triangular                                d) circular and semi-circular
- 5) Kalgurli and Kulgardi of Australia is famous for \_\_\_\_\_ towns.  
 a) Administrative                          b) mining  
 c) cultural                                    d) tourist
- 6) Ajmer and Haridwar are the \_\_\_\_\_ towns in India  
 a) administrative                          b) mining  
 c) religious                                  d) tourist
- 7) \_\_\_\_\_ is the topmost country in population in world since ancient time.  
 a) India                                        b) China  
 c) Canada                                    d) U.S.A.
- 8) The group of adults consists of \_\_\_\_\_ years in the developed countries.  
 a) 15 to 55                                  b) 15 to 60  
 c) 15 to 65                                  d) 18 to 65

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

- a) State the density of Population.
- b) Give the names of different types of agriculture.
- c) Concept of Sex ratio.
- d) State the types of rural pattern.
- e) Classify the agriculture on the basis of cropping pattern.
- f) State the shifting cultivation.

- Q.3 Write short notes on any two of the following. 08**
- a) State the Demographic transition theory.
  - b) Urbanization trend in India.
  - c) State the various causes of imbalance sex ratio in India.
- Q.4 Answer any two of the following. 08**
- a) State the types of rural settlements.
  - b) Describe the commercial grain farming type.
  - c) State the various agricultural problems with special reference to India.
- Q.5 Answer any one of the following. 08**
- a) Classify the functional town with good examples.
  - b) State the various factors affecting on agriculture.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - II) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Paper – IV)**  
**Mineralogy**

Day &amp; Date: Monday, 20-02-2023

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 diagram wherever necessary.

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

- 1) Which of the following mineral shows twinkling property?
  - a) Andalusite
  - b) Calcite
  - c) Phlogopite
  - d) None of these
- 2) Mineral Garnet is \_\_\_\_\_.
  - a) anisotropic
  - b) pleochroic
  - c) isotropic
  - d) None of these
- 3) The refractive index of Canada balsm is \_\_\_\_\_.
  - a) 1.658
  - b) 1.537
  - c) 1.516
  - d) 1.666
- 4) Uppernicol prism is called as \_\_\_\_\_.
  - a) polarizer
  - b) analyzer
  - c) condenser
  - d) pillar
- 5) Feldspar shows \_\_\_\_\_ sets of cleavages.
  - a) I
  - b) II
  - c) III
  - d) None
- 6) \_\_\_\_\_ mineral belongs to the mica group.
  - a) Orthoclase
  - b) Plagioclase
  - c) Biotite
  - d) All of these
- 7) Hardness of talc is \_\_\_\_\_.
  - a) 1
  - b) 5
  - c) 7
  - d) 8
- 8) Talc mineral having \_\_\_\_\_ hardness.
  - a) 1
  - b) 7
  - c) 5
  - d) 6

**Q.2 Answer Any Four of the following:** **08**

- a) Define streak of mineral? How can it determine.
- b) Name the parts of lower nicol prism?
- c) Define fracture of minerals.
- d) Colour of minerals.
- e) What is pleochroism of minerals.

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

- a) specific gravity
- b) Twinkling of minerals
- c) Relief of minerals

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

- a) Describe the form of mineral in physical properties of minerals.
- b) Describe the isotropic and anisotropic minerals.
- c) Describe the different chemical bonding in minerals.

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

- a) Describe luster, cleavage and Hardness of minerals.
- b) Describe optical properties form, twinning and extension of minerals.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Paper - V)**  
**Organic Chemistry**

Day & Date: Tuesday, 21-02-2023  
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

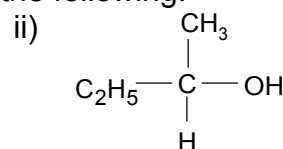
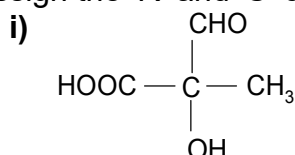
**Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.

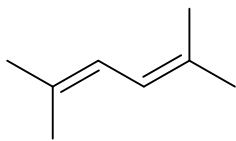
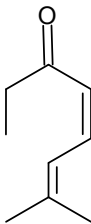
**Q.1 Choose the correct alternatives from the options.****08**

- Relative configuration is also known as \_\_\_\_\_.  
 a) 'D' and 'L' Nomenclature      b) 'R' and 'S' Nomenclature  
 c) 'E' and 'Z' Nomenclature      d) None of these
- Hypsochromic shift is a shift of absorption maximum to a \_\_\_\_\_.  
 a) longer wavelength  
 b) decrease in the intensity of absorption  
 c) shorter wavelength  
 d) none of these
- Hell-Volhard-Zelinsky reaction is used to prepare \_\_\_\_\_.  
 a) unsaturated acids      b) dicarboxylic acids  
 c) halo acids      d) hydroxy acids
- Preparation of ether by reacting sodium phenoxide with methyl halide is known as \_\_\_\_\_.  
 a) Williamson's synthesis      b) Wurtz reaction  
 c) Kolbe's reaction      d) Perkin reaction
- Phenyl hydrazine is obtained by the reduction of \_\_\_\_\_.  
 a) aniline      b) m- dinitrobenzene  
 c) nitrobenzene      d) benzene diazonium chloride
- Succinic acid on heating above its melting point sublimes largely and rest is converted in to \_\_\_\_\_.  
 a) malic acid      b) succinic anhydride  
 c) phthalic anhydride      d) succinamide
- Acid catalysed hydrolysis of ethylene oxide gives \_\_\_\_\_.  
 a) HO-CH<sub>2</sub>-CH<sub>2</sub>-CH<sub>2</sub>-OH      b) CH<sub>3</sub>-CH<sub>2</sub>-CH<sub>2</sub>-OH  
 c) CH<sub>3</sub>-CH<sub>2</sub>OH      d) HO-CH<sub>2</sub>-CH<sub>2</sub>-OH
- When phenol on treatment with allyl bromide in presence of aq. Sodium hydroxide gives \_\_\_\_\_.  
 a) anisole      b) ethyl phenyl ether  
 c) phenyl allyl ether      d) phenyl bromide

**Q.2 Answer the following questions. (Any Four)****08**

- a) Assign the 'R' and 'S' configuration to the following.



- b) How will you prepare ethylene glycol from  
 i) ethylene  
 ii) ethylene dibromide
- c) Calculate  $\lambda_{\max}$  for the following diene and enone by using Woodward-Fieser rule:  
 i)  ii) 
- d) What is the action of  
 i)  $\text{H}^+/\text{HgSO}_4/\text{H}_2\text{SO}_4$   
 ii)  $\text{Na}/\text{C}_2\text{H}_5\text{OH}$  on acrylic acid
- e) Discuss the structure and reactivity of carbonyl group.
- f) How will you synthesize malic acid from  
 i) maleic acid  
 ii)  $\alpha$  - bromo succinic acid

**Q.3 Write short notes. (Any Two)**

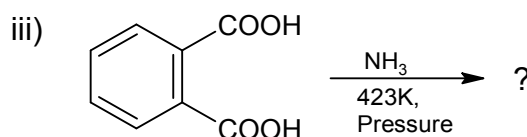
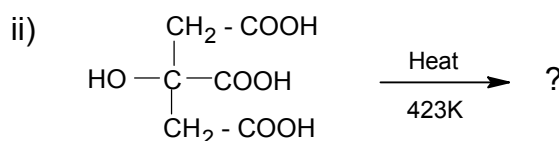
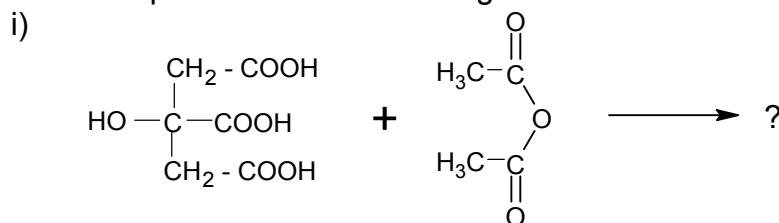
08

- a) Discuss the mechanism involved in Perkin reaction.
- b) With suitable example, explain the following terms used in UV spectroscopy:  
 i) Chromophore  
 ii) Auxochrome  
 iii) Bathochromic shift  
 iv) Hyperchromic shift
- c) How will you prepare Congo red dye?

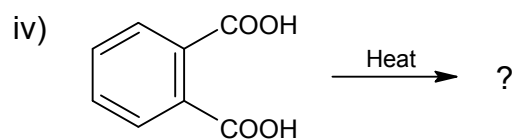
**Q.4 Answer the following questions. (Any Two)**

08

- a) Explain different types of electronic transitions involved in UV spectroscopy.
- b) An organic methoxy compound having molecular formula  $\text{C}_{11}\text{H}_9\text{NO}_3$  undergo Zeisel's estimation and gave  $2.52 \times 10^{-4}$  kg of silver iodide. Methoxy compound used is  $2.18 \times 10^{-4}$  kg. Calculate the percentage and number of methoxy groups per molecule.
- c) What are products of the following:







**Q.5 Answer the following question. (Any One)**

**08**

- a) What is conformational isomerism? Explain conformational analysis of n-butane with the help of energy profile diagram.
- b) What are Pinacols? How they are prepared? Give the Pinacol-Pinacolone rearrangement reaction with mechanism.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper - V)**  
**Data Structure**

Day & Date: Saturday, 04-03-2023  
 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 Choose the correct alternatives from the options.**

**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 of the following linked list below have last node of the list pointing to the first node?
  - a) circular doubly linked list
  - b) circular linked list
  - c) circular singly linked list
  - d) doubly linked list
- 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 the following questions. (Any Four)** **08**
- 1) Define dequeue.
  - 2) What is Binary tree? List out various types of binary trees.
  - 3) What is push and pop in stack?
  - 4) What is prefix expression  $A + (B / C) * D - E + F$ .
  - 5) What is doubly linked list?
  - 6) What binary search tree?
- Q.3 Write short note on any two of the following.** **08**
- 1) AVL Tree.
  - 2) Selection Sort technique.
  - 3) Priority Queue.
- Q.4 Answer any two of the following.** **08**
- 1) What is Binary Search tree? Explain the process to insert new node in binary search tree with its algorithm.
  - 2) Write a program of Insertion sort.
  - 3) What is linked list? Explain various types of linked list.
- Q.5 Answer any ONE of the following.** **08**
- a) Write a program for all traversal method of binary search tree.
  - b) Write program of binary search.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.2 Answer Any Four of the following:** **08**
- a) Define:
    - i) Ligand
    - ii) Coordination number
  - b) What are the causes of colouration in transition metal complexes?
  - c) State Pearson's principle.
  - d) Write the structure of EDTA and Give its anyone application.
  - e) What is geometrical isomerism? Give its anyone example.
  - f) Write the observed electronic configuration of Platinum and Gold.
- Q.3 Write short notes on any Two of the following.** **08**
- a) Difference between double salt and complex salt.
  - b) Structural requirements for chelate formation.
  - c) Catalytic properties of transition elements with examples.
- Q.4 Answer any Two of the following.** **08**
- a) Give the postulates of Werner's theory and explain the structure of  $\text{CoCl}_3 \cdot 3\text{NH}_3$ .
  - b) Give the classification of acids and bases as hard and soft acids and bases with example.
  - c) Compare first transition series with second and third transition series w.r.to reactivity, stability of complexes, stability of oxidation state and magnetic behavior.
- Q.5 Answer any One of the following.** **08**
- a) On the basis of VBT, explain the formation of  $[\text{Fe}(\text{CN})_6]^{3-}$  complex ion. Comment on its stability and magnetic property.
  - b) What are transition elements? Give the symbol, name, atomic number and electronic configuration of elements of first transition series.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper - VI)**  
**Design Analysis and Algorithm**

Day & Date: Monday, 06-03-2023  
 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 Questions.**

**08**

- 1) Which of following is/are not a type of Complexities of an Algorithm?
  - a) Logarithmic Complexity
  - b) Quadratic Complexity
  - c) Exponential Complexity
  - d) None of these
- 2) Which of the notation is used to express the lower bound of an algorithms running time?
  - a) Big -Oh notation
  - b) Theta Notation
  - c) Omega Notation
  - d) All of these
- 3) What is the best case complexity of selection sort?
  - a)  $O(n \log n)$
  - b)  $O(\log n)$
  - c)  $O(n)$
  - d)  $O(n^2)$
- 4) What are the true about an Algorithm?
  - a) To understand the basic idea of the problem.
  - b) To find an approach to solve the problem.
  - c) To improve the efficiency of existing techniques.
  - d) All of these
- 5) 0/1 Knapsack Problem can be solved by \_\_\_\_\_ approach.
  - a) Greedy algorithm
  - b) Divide and conquer
  - c) Dynamic programming
  - d) All of these
- 6) Huffman Code is an example of \_\_\_\_\_.
  - a) Divide and conquer algorithm
  - b) Greedy Algorithm
  - c) Dynamic programming
  - d) All of these
- 7) What is the objective of knapsack problem \_\_\_\_\_?
  - a) To get maximum total value in the knapsack
  - b) To get minimum total value in the knapsack
  - c) To get maximum weight in the knapsack
  - d) To get maximum weight in the knapsack
- 8) Bellman Ford Algorithm is an example for \_\_\_\_\_.
  - a) Dynamic Programming
  - b) single-source shortest path algorithm
  - c) Linear Programming
  - d) Branch and Bound Algorithm

- Q.2 Answer the following questions. (Any Four)** **08**
- 1) What is Algorithm?
  - 2) What is Time Complexity?
  - 3) What is space Complexity?
  - 4) What is Graph?
  - 5) What is Huffman Code?
  - 6) What is Tower of Hanoi problem?
- Q.3 Write short note on any two of the following.** **08**
- 1) Asymptotic notation
  - 2) Divide and Conquer Algorithm
  - 3) Branch and bound
- Q.4 Answer any two of the following.** **08**
- 1) What is Knapsack Problem? Explain 0/1 Knapsack Problem with example.
  - 2) Explain the Eight queens problem with example.
  - 3) Hamiltonian Circuit Problems.
- Q.5 Answer any one of the following.** **08**
- a) Explain Rabin-Karp algorithm with example.
  - b) What is Travelling Sales Person Problem? Explain with example.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper - V)**  
**General Physics and Sound**

Day & Date: Thursday, 23-02-2023  
 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 diagram 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 Choose the correct alternatives from the options.****08**

- 1) The rate of precession  $\Phi$  is \_\_\_\_\_.
  - a)  $\Phi = \frac{T_1}{I\omega}$
  - b)  $\Phi = \frac{I\omega}{T_1}$
  - c)  $\Phi = T_1 I \omega$
  - d)  $\Phi = T_1 \omega$
- 2) The gradient of scalar field is \_\_\_\_\_.
  - a) Scalar
  - b) Vector
  - c) constant
  - d) nonzero
- 3) Loud speaker converts \_\_\_\_\_ energy into sound energy.
  - a) optical
  - b) electrical
  - c) mechanical
  - d) heat
- 4) The C.G.S. unit of viscosity is \_\_\_\_\_.
  - a) Poise
  - b) kg/ms
  - c) gm cm/s
  - d) N/S<sup>2</sup>
- 5) The rise and fall of axis of rotation of a rotating body is called \_\_\_\_\_.
  - a) nutation
  - b) precession
  - c) rotation
  - d) vibration
- 6) If  $\vec{A} \cdot (\vec{B} \times \vec{C}) = 0$  then vectors  $\vec{A}$ ,  $\vec{B}$ , and  $\vec{C}$  are \_\_\_\_\_.
  - a) collinear
  - b) parallel
  - c) antiparallel
  - d) coplanar
- 7) Bending moment of a beam is \_\_\_\_\_.
  - a) Directly proportional to the modulus of rigidity
  - b) Inversely proportional to the modulus of rigidity
  - c) Directly proportional to the radius of curvature
  - d) Inversely proportional to the radius of curvature
- 8) By giving torsional oscillations to the spring, we can determine \_\_\_\_\_.
  - a) Young's modulus
  - b) Bulk modulus
  - c) modulus of rigidity
  - d) Poisson's ratio



- Q.2 Answer Any Four of the following:** **08**
- a) What is precession?
  - b) State Lanchester's rule.
  - c) Define neutral surface and neutral axis.
  - d) Define transducers and give its examples.
  - e) What is a scalar field? Give one example.
  - f) Define critical velocity of a rolling disc.
- Q.3 Write short notes on any Two of the following.** **08**
- a) Ostwald's viscometer
  - b) Gyroscope
  - c) Carbon microphone
- Q.4 Answer any Two of the following.** **08**
- a) Define vector triple product and obtain an expression for it.
  - b) Derive Sabine's formula for reverberation time.
  - c) Obtain an expression for depression produced at the end of a bar forming a cantilever.
- Q.5 Answer any One of the following.** **08**
- a) Define gyrostatic pendulum and obtain an expression for its period.
  - b) Give the construction of Searle's viscometer. Explain how it can be used to determine Viscosity of viscous liquids. Obtain an expression for coefficient of viscosity.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**BIO-CHEMISTRY (Paper – I)**  
**Biomolecules**

Day & Date: Wednesday, 08-03-2023  
 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 and give equations wherever necessary.

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

- 1) \_\_\_\_\_ is water soluble vitamin.
 

|               |              |
|---------------|--------------|
| a) Vitamin A  | b) Vitamin K |
| c) Vitamin B1 | d) Vitamin E |
- 2) Which part of the amino acid gives its uniqueness?
 

|                |                      |
|----------------|----------------------|
| a) amino group | b) carboxyl group    |
| c) side chain  | d) none of the above |
- 3) \_\_\_\_\_ is a phospholipid.
 

|             |                |
|-------------|----------------|
| a) Lecithin | b) Cholesterol |
| c) Sterol   | d) Steroid     |
- 4) \_\_\_\_\_ is the composition of nucleoside.
 

|                      |                             |
|----------------------|-----------------------------|
| a) Base + phosphate  | b) Base + Sugar             |
| c) Sugar + Phosphate | d) Base + Sugar + Phosphate |
- 5) Deficiency of vitamin B6 results \_\_\_\_\_.
 

|                    |                 |
|--------------------|-----------------|
| a) night blindness | b) oedema       |
| c) pellagra        | d) burning feet |
- 6) \_\_\_\_\_ linkages are present in the proteins.
 

|               |                   |
|---------------|-------------------|
| a) Glycosodic | b) Phosphodiester |
| c) Ester      | d) peptide        |
- 7) Terpenes are lipids derived from \_\_\_\_\_.
 

|                 |                  |
|-----------------|------------------|
| a) isoprene     | b) phospholipids |
| c) Both a and b | d) None of these |
- 8) In 1953, Watson and Crick explained structure of DNA using \_\_\_\_\_.
 

|                      |        |
|----------------------|--------|
| a) IR                | b) UV  |
| c) X-ray diffraction | d) NMR |

**Q.2 Answer Any Four of the following: 08**

- a) Define simple lipid and compound lipid.
- b) Write the sources of Retinol and Riboflavin.
- c) Write the structures of Glyceraldehyde and Erythrose.
- d) Write the functions of carotenes.
- e) Write two components of nucleic acid with example.
- f) What is the biochemical role of niacin and pantothenic acid?

- Q.3 Write short notes on any Two of the following. 08**
- a) Explain fluid mosaic model of plasma membrane.
  - b) Write the structure and role of Starch.
  - c) Explain Watson Crick model of DNA.
- Q.4 Answer any Two of the following. 08**
- a) Explain the classification of enzymes.
  - b) Write the structure and functions of tRNA.
  - c) Write the deficiency disorders of thiamine and pyridoxine.
- Q.5 Answer any One of the following. 08**
- a) Write the classification of carbohydrates and role of Maltose and Sucrose.
  - b) Explain in detail types of proteins with examples.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**PLANT PROTECTION (Paper – I)**

**Major crops and methods of integrated plant protection**

Day &amp; Date: Wednesday, 08-03-2023

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.  
 3) Draw neat diagram and give equations wherever necessary.

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

**08**

- 1) Plant protection means \_\_\_\_\_.  
 a) Protection of plants from sunlight  
 b) Protection of plants from wind  
 c) Practice of management of pest, disease and weeds  
 d) None of these
- 2) Jawar belongs to family \_\_\_\_\_.  
 a) Solanaceae  
 b) Poaceae  
 c) Graminae  
 d) Malvaceae
- 3) Glycine max is a botanical name of \_\_\_\_\_.  
 a) Tur  
 b) Sunflower  
 c) Soyabean  
 d) Sugarcane
- 4) Country Africa is a origin of \_\_\_\_\_.  
 a) Jawar  
 b) Sugarcane  
 c) Tur  
 d) Papaya
- 5) Ethanol byproduct obtained from \_\_\_\_\_.  
 a) Soyabean  
 b) Sugarcane  
 c) G. nut  
 d) Sunflower
- 6) Ripened grape berries are used for preparation of \_\_\_\_\_.  
 a) Kishmish  
 b) Floor  
 c) Asawa  
 d) Salads
- 7) \_\_\_\_\_ is used as a algal biofertilizer.  
 a) Spirogyra  
 b) Anabaena  
 c) Oscillations  
 d) None of these
- 8) Legal control of disease transfer or disease caused Pathogen are known as \_\_\_\_\_.  
 a) Resistance  
 b) Quarantine  
 c) Management  
 d) None of these

**Q.2 Answer Any Four of the following:**

**08**

- a) Give economic importance of Jawar.
- b) What is rope bagging?
- c) Give any four uses of fungicides.
- d) Give economic importance of brinjal.
- e) Write in brief preparation of 'Gulabjal'.

- Q.3 Write short notes on any Two of the following. 08**
- a) Biological control of disease.
  - b) Give role of organic farming in agriculture.
  - c) Write on 'applications of biofertilizers'.
- Q.4 Answer any Two of the following. 08**
- a) Explain in brief, need of plant quarantine in India.
  - b) What is soil solarization?
  - c) Uses of sticky bands.
- Q.5 Answer any One of the following. 08**
- a) Describe the gross morphology, identification, soil type, tillage, seed rate and spacing, intercultural operations, fertilizers, irrigation, intercropping, yield and economics importance of Soyabean.
  - b) Describe the gross morphology, identification, soil type, tillage, seed rate and spacing, intercultural operations, fertilizers, irrigation, intercropping, yield and economic importance of Rose.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper - VI)**  
**Electronics**

Day & Date: Friday, 24-02-2023  
 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 log table and calculators is allowed.

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

**08**

- 1) In Colpitt's oscillator \_\_\_\_\_ feedback is used.
  - a) Positive
  - b) Negative
  - c) Zero
  - d) One
- 2) In a tank circuit the oscillations are \_\_\_\_\_.
  - a) Undamped
  - b) damped
  - c) Sawtooth
  - d) Sinusoidal
- 3) A differential amplifier is used to amplify \_\_\_\_\_.
  - a) d. c. signals
  - b) a. c. signals
  - c) both d.c. and a.c. signal
  - d) None of these
- 4) Negative feedback in amplifier circuit
  - a) increases the distortion
  - b) increases the bandwidth
  - c) increases the noise
  - d) increases the instability
- 5) UJT has  $\eta = 0.6$  and  $R_{BB} = 10\text{ K}\Omega$ , the value of  $R_{B1}$  is \_\_\_\_\_.
  - a)  $4\text{ K}\Omega$
  - b)  $10\text{ K}\Omega$
  - c)  $2\text{ K}\Omega$
  - d)  $6\text{ K}\Omega$
- 6) A voltage at which drain current ( $I_d$ ) levels off is called \_\_\_\_\_.
  - a) breakdown voltage
  - b) reverse saturation voltage
  - c) pinch off voltage
  - d) ohmic voltage
- 7) The time period of waveform measured on CRO is 10 ms the unknown frequency of wave is \_\_\_\_\_.
  - a) 50 Hz
  - b) 100 Hz
  - c) 150 Hz
  - d) 200 Hz
- 8) IC 7805 is a \_\_\_\_\_ volt regulator.
  - a) +5
  - b) -5
  - c) 8
  - d) 7

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

**08**

- a) Draw and equivalent circuit of UJT.
- b) Write any two uses of CRO.
- c) What is feedback? Give its type.
- d) A power supply gives 30 volt output for no load condition, find the percentage of voltage regulation if the full load voltage is 25 volt.

- e) Calculate the frequency of oscillation in Phase shift oscillator if  $R = 100\text{ K}\Omega$  and  $C = 0.05\text{ }\mu\text{F}$ .
- f) Draw diagram of CRT.

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

- a) What are the different methods of biasing the transistor? Explain voltage divider bias method with circuit analysis.
- b) Define the term line regulation and load regulation.
- c) In UJT relaxation oscillator charging resistance is  $33\text{ K}\Omega$  and capacitor is  $0.01\text{ }\mu\text{F}$ . Calculate the frequency of saw tooth waveform produced by relaxation oscillator (Given  $\eta = 0.6$ ).

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

- a) When CRO is used to determine unknown frequency, the study wave of pattern on 1 ms knob gives 10 divisions on the horizontal scale as wavelength. What is the unknown frequency?
- b) Explain the construction of FET and its characteristics with necessary diagram.
- c) Draw block diagram of digital multimeter and explain its applications.

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

- a) Explain transistor RC coupled amplifier with special reference to advantages, disadvantages and applications.
- b) Draw circuit diagram of Hartley oscillator and explain its working.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|



- Q.3 Write short notes on any two of the following. 08**
- a) Write the working and applications of photoelectric colorimeter.
  - b) How chromatoplate is prepared in TLC? Explain sample application process in TLC.
  - c) Write note on factors affecting electrophoretic mobility.
- Q.4 Answer any two of the following questions. 08**
- a) Write the technique of polymerase chain reaction.
  - b) Explain Zak's method for cholesterol estimation.
  - c) Write note on southern blotting technique.
- Q.5 Answer any one of the following questions. 08**
- a) Write the principle, technique and applications of Gel permeation chromatography.
  - b) Write principle, technique and applications of 2-D gel electrophoresis.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester – III) (CBCS) Examination: Oct/Nov-2022**  
**PLANT PROTECTION (Paper – II)**  
**Crop Diseases and Their Management**

Day & Date: Thursday, 09-03-2023

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.  
3) Draw neat and labeled diagram wherever necessary.

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

08

- 1) The ability of pathogen to cause the disease is known as \_\_\_\_\_.  
a) Pathogenesis                      b) Pathogenicity  
c) Immunity                          d) Susceptibility
- 2) \_\_\_\_\_ Diseases spreads throughout entire plant body.  
a) Localised                          b) Systemic  
c) Epidemic                          d) Sporadic
- 3) A sooty or charcoal- like powdery mass is \_\_\_\_\_.  
a) Rust                                b) Smut  
c) Scab                                 d) Blotch
- 4) \_\_\_\_\_ disease is classified on the basis of symptoms.  
a) Infectious                        b) Non- infectious  
c) Chlorosis                         d) None of these
- 5) Causal organism of Grain smut of jowar is \_\_\_\_\_.  
a) *Sphaceloiheca sorghi*            b) *Xanthomonas citri*  
c) MLOS                              d) *Hibiscus I*
- 6) *Phakospora pachyrrhiza*, is causal organism of \_\_\_\_\_ host plant.  
a) Groundnut                        b) Soybean  
c) Okra                                 d) Cucurbit
- 7) Keeping inoculated micro-organisms on suitable medium at particular temperature and time is process called as \_\_\_\_\_.  
a) Isolation                         b) Infection  
c) A&B                                d) Incubation
- 8) The entry of plants, plant parts and their products is conditioned, regulated and restricted at national and international levels through \_\_\_\_\_.  
a) National Act                      b) International Act  
c) Quarantine Act                  d) None of these

**Q.2 Answer Any Four of the following:**

08

- Etiology
- Infection
- Diseases
- Write the causal organism of Rust of Soybean.
- Mention any two symptoms of viral disease of okra plant.
- Mention factors affecting to infection.

- Q.3 Write short notes on any Two of the following. 08**
- a) Methods of inoculation
  - b) Control measures of Downy mildew of Graps.
  - c) Kotch 's Postulates
- 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) Write the Principles of plant disease management.
  - b) Describe in details about Grain smut of jawar.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

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

- a) Define Poisson distribution.
- b) State mean and variance of geometric distribution.
- c) Define negative binomial distribution.
- d) Define Harmonic mean for continuous random variable  $X$ .
- e) State multiplication theorem on expectation.

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

- a) If  $X$  is a Poisson variate with mean  $\lambda$  and if  $P[X = 2] = P[X = 1]$ , then find
  - a)  $\lambda$
  - b)  $P(X \geq 4)$
- b) Find c.d.f. of a geometric distribution with parameter  $p$  and use it to find c.d.f. of waiting time distribution with parameter  $p$ .
- c) Verify whether the function

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

Is a p.d.f. of a continuous r.v.  $X$ . Also find mean.

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

- a) Find moment generating function of negative binomial distribution.
- b) Obtain mean and variance of waiting time distribution.
- c) If a r.v.  $X$  has p.d.f.

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

find mean and variance of  $X$ .

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

- a) Show that Poisson distribution is a limiting case of binomial distribution.
- b) Let  $X$  and  $Y$  be continuous random variables having joint p.d.f.

$$f(x, y) = \begin{cases} 12xy(1-y) & ; 0 < x < 1, 0 < y < 1 \\ 0 & ; \text{otherwise} \end{cases}$$

Show that  $X$  and  $Y$  are independent.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.3 Write short note on any two of the following. 08**
- 1) Composition of the atmosphere.
  - 2) Explain branches of Climatology.
  - 3) Sources region of air masses.
- Q.4 Answer any two of the following. 08**
- 1) Explain the life cycle of cyclone.
  - 2) Discuss on Climatic records and statistics.
  - 3) 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.

|  |  |
|--|--|
|  |  |
|--|--|

## Max. Marks: 40

08

- 08

- Page 1 of 2



- Q.3 Write short note on any two of the following.** **08**
- 1) Write the classification of organic compounds.
  - 2) Explain one component (water and sulphur) system.
  - 3) Write brief idea of radii of common ions in rock forming minerals.
- Q.4 Answer any two of the following.** **08**
- 1) Explain Gibbs phase rule.
  - 2) Explain electrical, mechanical properties of colloids.
  - 3) Explain clay minerals as colloids.
- Q.5 Answer any one of the following.** **08**
- a) Explain lattice energy of crystals, coordination number and structure of Sodium Chloride.
  - b) What is homologous series and describe empirical and molecular formula of organic compound.

**Seat  
No.**

Day & Date: Friday, 10-03-2023  
Time: 09:00 AM To 11:00 AM

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

08

- 1) Microtubules are made up of \_\_\_\_\_.  
a) Actin protein                      b) Globulin protein  
c) Myosin protein                  d) Tubulin protein
- 2) The nuclear envelope is also called as \_\_\_\_\_.  
a) Karyotheca                        b) Atheca  
c) Monotheca                         d) Diplothecha
- 3) Histones are present in \_\_\_\_\_.  
a) Lysosomes                          b) Spherosomes  
c) Nucleosomes                      d) Cell membrane
- 4) The prokaryotic cells are characterised by \_\_\_\_\_.  
a) Distinct chromosome              b) Absence of chromatin  
c) Absence of nuclear membrane   d) Presence of nuclear membrane
- 5) In meiosis pairing of homologous chromosomes takes place during \_\_\_\_\_ substage  
a) Leptotene                          b) Zygotene  
c) Pachytene                         d) Diplotene
- 6) Fluid mosaic model of plasma membrane was proposed by \_\_\_\_\_.  
a) Singer and Nicolson                b) Robertson  
c) Darson- Danielli                  d) Landsteiner
- 7) The energy generated from mitochondria is called \_\_\_\_\_.  
a) MTP                                 b) ATP  
c) GTP                                 d) ADP
- 8) In cells \_\_\_\_\_ plays important role in protein synthesis.  
a) Endoplasmic reticulum            b) Golgi complex  
c) Mitochondria                       d) Lysosomes

08

- a) Cell signaling
- b) Meiosis
- c) Eukaryotic cell
- d) Nucleosome
- e) Cell cycle
- f) Functions of golgi apparatus

- Q.3 Write short notes on any Two of the following. 08**
- a) Bacterial cell
  - b) Functions of nucleus
  - c) Fluid mosaic model of plasma membrane
- Q.4 Answer any Two of the following. 08**
- a) Role of secondary messenger (cAMP).
  - b) Define chromatin? Describe the euchromatin and heterochromatin.
  - c) Describe the ultrastructure of mitochondria.
- Q.5 Answer any One of the following. 08**
- a) Define cytoskeleton. Describe the structure and functions of microtubule.
  - b) What are lysosomes? Describe the types and functions of lysosomes.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Paper-VI)**  
**Statistical Methods**

Day & Date: Monday, 27-02-2023  
 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 Choose the correct alternatives from the options.**

**08**

- 1) In usual notations
 

|                                          |                                            |
|------------------------------------------|--------------------------------------------|
| a) $b_{13.2} \times b_{31.2} = r_{13.2}$ | b) $b_{13.2} \times b_{31.2} = r_{13.2}^2$ |
| c) $b_{13.2} \times b_{31.2} = r_{31.2}$ | d) $b_{13.2} \times b_{13.2} = r_{13.2}$   |
- 2) If  $\text{Var}(X_{1.23}) = 0$  then  $R_{1.23}$  is
 

|        |                  |
|--------|------------------|
| a) 1   | b) 0             |
| c) 0.5 | d) None of these |
- 3) The range of multiple correlation coefficient is \_\_\_\_\_.
 

|                          |                  |
|--------------------------|------------------|
| a) -1 to +1              | b) 0 to $\infty$ |
| c) $-\infty$ to $\infty$ | d) 0 to 1        |
- 4) The variance of the fraction defectives is obtained by the variance of \_\_\_\_\_ distribution.
 

|              |                   |
|--------------|-------------------|
| a) Binomial  | b) Poisson        |
| c) Geometric | d) Hypergeometric |
- 5) The Shewhart control charts are meant to \_\_\_\_\_.
 

|                                                                    |
|--------------------------------------------------------------------|
| a) detect whether the process is under statistical quality control |
| b) find the assignable causes                                      |
| c) reflect the selection of sample                                 |
| d) all of the above                                                |
- 6) The number of all possible samples of size two with replacement from a population of 4 units is \_\_\_\_\_.
 

|      |       |
|------|-------|
| a) 2 | b) 4  |
| c) 8 | d) 16 |
- 7) The  $\text{Corr}(X_{1.3}, X_{2.3})$  is \_\_\_\_\_.
 

|               |               |
|---------------|---------------|
| a) $r_{12}$   | b) $r_{13}$   |
| c) $r_{12.3}$ | d) $r_{13.2}$ |
- 8) The unknown constant of population under study is called \_\_\_\_\_.
 

|                |                 |
|----------------|-----------------|
| a) a statistic | b) an estimator |
| c) an estimate | d) a parameter  |

**Q.2 Answer the following questions. (Any Four)**

**08**

- a) Show that a multiple correlation coefficient cannot be negative.
- b) Distinguish between defect and defective.
- c) State the control limits for  $\bar{X}$  and R – charts when standards are not given.
- d) Define partial correlation coefficient  $r_{12.3}$
- e) Define chance causes of variation.
- f) Define a parameter.

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

**08**

- a) With usual notation, prove that  $\sqrt{(b_{ij.k} * b_{ji.k})} = r_{ij.k}$
- b) Prove that, in SRSWR, expected value of product of population size and sample mean is population total.
- c) State different criteria for detecting lack of control of the process from a control chart.

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

**08**

- a) With usual notation, prove that in SRSWR.  
 $E(\bar{y}_n) = \bar{Y}_N$
- b) Obtain an expression for mean and variance of the residual  $X_{12.3}$
- c) Explain the criteria of detecting lack of control chart.

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

**08**

- a) Show that in case of SRSWOR expected value of the sample mean square is population mean square.
- b) Define residual, order of residual and state any two properties of residual.

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**METEOROLOGY (Paper – II)**  
**General Meteorology**

Max. Marks: 40

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

## 08

- 1) The atmospheric air is held to the Earth by \_\_\_\_\_.  
a) Gravity  
b) Winds  
c) Clouds  
d) Rotation of the Earth
- 2) Which of the following has the highest entropy?  
a) Hydrogen  
b) Diamond  
c) Liquid nitrogen  
d) Mercury
- 3) The inertial frame of reference is \_\_\_\_\_ frame of reference.  
a) an accelerated  
b) a rotating  
c) unaccelerated  
d) Both a and c
- 4) The spatial variation in density is generally called as \_\_\_\_\_.  
a) pseudo force  
b) density gradient  
c) velocity gradient  
d) Coriolis force
- 5) What device converts light energy to electrical energy?  
a) Photodiode  
b) Photovoltaic cell  
c) Thermocouple  
d) Heliostats
- 6) In solar cells material \_\_\_\_\_ is used.  
a) Copper  
b) Silver  
c) Silicon  
d) Iron
- 7) 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)  $W = -(\vec{F} \times \vec{S})$
- 8) In energy technology, worthless energy is called as \_\_\_\_\_.  
a) synergy  
b) exergy  
c) anergy  
d) work

## 08

- Define atmosphere.
- Mention different layers of atmosphere.
- Mention effects of Coriolis force in nature.
- What is a solar cell?
- How chain and modules are formed using solar cells?
- What are various sciences to which Energy science is related?

- Q.3 Write short notes on any Two of the following. 08**
- a) Discuss effects of scattering.
  - b) What is tephigram?
  - c) What is pressure gradient force?
- Q.4 Answer any Two of the following. 08**
- a) State and explain Buys-Ballot's law.
  - b) What is geo-stationary satellite?
  - c) Discuss energy, man and environment.
- 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) Explain the formation of ozone in the stratosphere.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Day & Date: Saturday, 11-03-2023  
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 labeled diagrams wherever necessary.

08

- 1) The element with maximum cosmic abundance is \_\_\_\_\_.  
a) Helium                                      b) Hydrogen  
c) Nitrogen                                    d) Oxygen
- 2) The upper crust of the earth mainly consist of \_\_\_\_\_.  
a) Sandstone                                  b) Shale  
c) Limestone                                 d) Igneous and metamorphic rocks
- 3) Which one of the following aerolites are \_\_\_\_\_?  
a) Iron meteorites                            b) Iron-stony meteorites  
c) Stony meteorites                          d) Metallic meteorites
- 4) Elements which readily-form ions with an outermost 8-electron shell are: \_\_\_\_\_.  
a) Siderophile                                b) Chalcophile  
c) Lithophile                                 d) Atmophile
- 5) The upper limit of the stratosphere is called \_\_\_\_\_.  
a) Stratopause                                b) Tropopause  
c) Mesopause                                d) Thermopause
- 6) The major dissolved constituent in the sea water is \_\_\_\_\_.  
a) C1, Br, SO<sub>4</sub>, F                            b) C1, Br, SO<sub>4</sub>, HCO<sub>3</sub>  
c) C1, Br, SO<sub>4</sub>, H<sub>3</sub>BO<sub>3</sub>                    d) C1, Br, SO<sub>4</sub>, Mg
- 7) Which planets revolve in retrograde motion?  
a) Uranus and Venus                        b) Earth and Mars  
c) Neptune and Pluto                      d) Mercury and Jupiter
- 8) During second stage of evolution of the atmosphere, majority of oxygen was used for \_\_\_\_\_.  
a) oxidation                                    b) reduction  
c) carbonation                                d) sulphate

08

- Who coined the concept of geochemical classification of the elements?
- What is transition zone?
- Names of variable constituents of the atmosphere.
- What is pyrolite?
- Name the types of siderites meteorites?
- What is the composition of upper mantle?



- Q.3 Write Short Notes. (Any Two)** **08**
- a) Explain in brief the cosmic abundance of elements.
  - b) Discuss in short structure of atmosphere with neat labeled diagram.
  - c) Write note on salinity and chlorinity of oceanic water.
- Q.4 Answer the following questions. (Any Two)** **08**
- a) Explain the primary differentiation of the elements.
  - b) Write short note on Aerolite type of meteorites.
  - c) Describe in short, the atmospheric addition and losses during geologic time.
- Q.5 Answer the following questions. (Any One)** **08**
- a) Explain in brief, geochemical classification of the elements.
  - b) Discuss in brief the zonal structure of the earth with suitable diagram.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Paper – VI)**  
**Principles of Ecology**

Day &amp; Date: Saturday, 11-03-2023

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.  
 3) Draw neat and labeled diagram wherever necessary.  
 4) Use of calculator is allowed.

**Q.1 Multiple Choice questions.****08**

- 1) Autecology is also called \_\_\_\_\_ ecology.
 

|            |            |
|------------|------------|
| a) Species | b) Habitat |
| c) Niche   | d) Animal  |
- 2) The study of groups of organisms in relation to their environment is called \_\_\_\_\_.
 

|               |               |
|---------------|---------------|
| a) Autecology | b) Synecology |
| c) Ecosystem  | d) Community  |
- 3) All animals eventually will die is an example of \_\_\_\_\_.
 

|              |              |
|--------------|--------------|
| a) Natality  | b) Fecundity |
| c) Mortality | d) Fertility |
- 4) \_\_\_\_\_ tables are used to construct survivorship curves.
 

|               |           |
|---------------|-----------|
| a) Life       | b) Log    |
| c) Arithmetic | d) Wooden |
- 5) Sharks, dolphins and seabirds often eat the same type of fish in ocean ecosystems which is example of an \_\_\_\_\_.
 

|                             |                               |
|-----------------------------|-------------------------------|
| a) Interspecies competition | b) Intra specific competition |
| c) Ecosystem                | d) Synecology                 |
- 6) Lotic and lentic are the types of \_\_\_\_\_ ecosystem.
 

|                 |                |
|-----------------|----------------|
| a) Marine water | b) Fresh water |
| c) Grassland    | d) Desert      |
- 7) \_\_\_\_\_ is a graphical representation of the energy found within the trophic levels of an ecosystem.
 

|                       |               |
|-----------------------|---------------|
| a) Survivorship curve | b) Life table |
| c) Ecological pyramid | d) Niche      |
- 8) Ficus Religiosa (Peepal) tree is common example of \_\_\_\_\_.
 

|              |                  |
|--------------|------------------|
| a) Grassland | b) Sacred groove |
| c) Forest    | d) Hot spot      |

**Q.2 Answer Any Four of the following:****08**

- a) Define Mortality.
- b) Give an example of mutualism.
- c) General characteristics of lotic ecosystem.
- d) Food chain of pond ecosystem.
- e) What is ecological succession?
- f) Examples of hot spots in India.

- Q.3 Write short notes on any Two of the following. 08**
- a) Describe commensalism with suitable example.
  - b) Give an account on effect of temperature on animals.
  - c) Describe characteristics of grassland ecosystem.
- Q.4 Answer any Two of the following. 08**
- a) Describe parental care in fishes.
  - b) Give an account on community characteristics.
  - c) Describe faunal adaptations in desert ecosystem.
- Q.5 Answer any One of the following. 08**
- a) Give an account on survivorship curve.
  - b) Describe the pond ecosystem.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**Q.2 Answer Any Four of the following:**

- Find the radius of curvature at any point on  $y = c \cdot \cos h(x/c)$ .
- If  $u = e^x \cdot \cos y$ ,  $v = e^x \sin y$  find  $\frac{\partial(u,v)}{\partial(x,y)}$ .
- Show that the functions  $u = x + y - z$ ,  $v = x - y + z$ ,  $w = x^2 + y^2 + z^2 - 2yz$  are dependent to each other.
- State the conditions for stationary value of a function of two variables.
- Find the equation of tangent at the point 't' to the curve  $x = a \cdot \sin^3 t$ ,  $y = b \cos^3 t$ .
- Find the length of subnormal for the curve  $y = b \cdot e^{x/a}$

**Q.3 Answer any Two of the following.**

- For the curve  $y = f(x)$  show that,

$$1) \quad \frac{ds}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$$

$$2) \quad \frac{ds}{dy} = \sqrt{1 + \left(\frac{dx}{dy}\right)^2}$$

- Find the radius of curvature at any point  $(r, \theta)$  on the curve  $r^m = a^m \cdot \cos m\theta$
- If  $u, v, w$  be functions of three variables  $x, y, z$ . If J be Jacobian of  $u, v, w$  with respect to  $x, y, z$  then prove that  $J \cdot J' = 1$ .

**Q.4 Answer any Two of the following.**

- Find the length of tangent, length of normal, length of sub tangent and length of sub-normal to the parabola  $y^2 = 4ax$  at any point  $P(x, y)$ .
- Find the radius of curvature for the ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$
- Explain how to find the extreme values of the function  $u = f(x, y, z)$  subject to the condition  $\phi(x, y, z) = 0$  by using Lagrange's method of undertermined multipliers.

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

- Obtain the expression for radius of curvature  $\rho$  for the curve  $x = \phi(t)$ ,  $y = \Psi(t)$  and hence find  $\rho$  for  $x = a \cos \theta$ ,  $y = b \sin \theta$  at  $\theta = \pi/4$ .
- If  $u, v, w$  are functions of  $x, y, z$  having first order partial derivatives and  $x, y, z$  are themselves functions of  $p, q, r$  having first order partial derivatives then show that,  $\frac{\partial(u,v,w)}{\partial(p,q,r)} = \frac{\partial(u,v,w)}{\partial(x,y,z)} \cdot \frac{\partial(x,y,z)}{\partial(p,q,r)}$  and hence find  $\frac{\partial(x,y)}{\partial(r,\theta)}$  for  $x = a(u + v)$ ,  $y = b(u - v)$  and  $u = r^2 \cos 2\theta$ ,  $v = r^2 \cdot \sin 2\theta$ .

**P**

Max. Marks: 40

08

08

- Q.3 Write short note on any two of the following. 08**
- a) Permanent tissue
  - b) Types of Vascular bundles
  - c) Sclerenchyma tissue
- Q.4 Answer any two of the following. 08**
- a) Explain secondary growth in dicot stem.
  - b) Write on primary structure in monocot stem
  - c) Tunica- carpenter theory.
- Q.5 Answer any one of the following. 08**
- a) Write in brief on epidermal tissue system
  - b) Abnormal secondary growth in monocot.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov- 2022**  
**MATHEMATICS (Paper - VI)**  
**Laplace Transform**

Day & Date: Wednesday, 01-03-2023  
 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 alternatives from the options.**

**14**

1)  $L\{e^{at} t^n\} = \underline{\hspace{2cm}}$

a)  $\frac{n!}{(p-a)^n}$

b)  $\frac{n!}{p-a}$

c)  $\frac{n!}{(p-a)^{n+1}}$

d)  $\frac{n!}{(p+a)^{n+1}}$

2)  $L\{\sin t \cos t\} = \underline{\hspace{2cm}}$

a)  $\frac{1}{p^2+4}$

b)  $\frac{2}{p^2+4}$

c)  $\frac{p}{p^2+4}$

d)  $\frac{4}{p^2-4}$

3)  $L\{\cosh at\} = \underline{\hspace{2cm}}$

a)  $\frac{a}{p^2+a^2}$

b)  $\frac{p}{p^2+a^2}$

c)  $\frac{p}{p^2-a^2}$

d)  $\frac{a}{p^2-a^2}$

4)  $L^{-1}\left\{\frac{1}{p^4}\right\} = \underline{\hspace{2cm}}$

a)  $\frac{t^2}{6}$

b)  $\frac{t^3}{6}$

c)  $\frac{t^4}{6}$

d)  $\frac{-t^3}{6}$

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

a)  $\frac{n}{a} \sinh at$

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

c)  $\frac{1}{a} \sin at$

d)  $\cos at$

6)  $L^{-1}\left\{\frac{6}{2p-3}\right\} = \underline{\hspace{2cm}}$

a)  $2e^{3t/2}$

b)  $-2e^{3t/2}$

c)  $3e^{3t/2}$

d)  $3e^{-3t/2}$



7)  $L\left\{\frac{\partial^2 y}{\partial x^2}\right\} = \underline{\hspace{2cm}}$

a)  $\frac{d^2 \bar{y}}{dx^2}$

c) 1

b) 0

d)  $-1$

8) If  $L\{y(x, t)\} = \bar{y}(x, p)$  then  $L\left\{\frac{\partial y}{\partial t}\right\} = \underline{\hspace{2cm}}$

a)  $x\bar{y}(x, p) + y(x, 0)$

b)  $p\bar{y}(x, p) - y(x, 0)$

c)  $p\bar{y}(x, 0) - y(x, p)$

d) None of these

**Q.2 Answer the following questions. (Any Four)**

08

**a)** Find  $L\{e^{-t}\cos 2t\}$

**b)** Find  $L\{t \sin at\}$

**c)** If  $L\{F(t)\} = f(p)$  then  $L\{e^{at}F(t)\} = f(p - a)$

**d)** Find  $L^{-1} \left\{ \frac{2p-5}{p^2-9} \right\}$

**e)** Find  $L^{-1} \left\{ \frac{p+3}{p^2+6p+25} \right\}$

**f)** If  $L^{-1}\{f(p)\} = F(t)$  and  $F(0) = 0$  then  $L^{-1}\{pf(p)\} = F'(t)$

**Q.3 Answer the following questions. (Any Two)**

08

**a)** If  $L^{-1}\{f(p)\} = F(t)$  then  $L^{-1}\{f(ap)\} = \frac{1}{a}F\left(\frac{t}{a}\right)$

**b)** If  $L\{F(t)\} = f(p)$  then  $L\{e^{at} F(t)\} = f(p - a)$

**c)** Solve  $\frac{d^2y}{dt^2} + y = 0$  under the conditions that  $y = 1, \frac{dy}{dt} = 0$  at  $t = 0$

**Q.4 Answer the following questions. (Any Two)**

08

**a)** Solve  $tY'' + Y' + 4tY = 0$ ,  $Y(0) = 3$ ,  $Y'(0) = 0$

**b)** Find  $L \left\{ \frac{1}{t} e^{-t} \sin t \right\}$

**c)** Find  $L^{-1} \left\{ \frac{2p^2-4}{(p+1)(p-2)(p-3)} \right\}$

**Q.5 Answer the following questions. (Any One)**

08

a) State and prove convolution theorem.

**b)** Solve the following partial differential equation.

$$\frac{\partial y}{\partial t} = 2 \frac{\partial^2 y}{\partial x^2}; \quad y(0, t) = 0, \quad y(x, 0) = 10 \sin 4\pi x, \quad y(5, t) = 0$$

**Seat  
No.**

Day & Date: Tuesday, 14-03-2023  
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 diagram and give equations wherever necessary.

## 08

- 1) The coenzyme is \_\_\_\_\_.  
a) Often a metal  
b) always a protein  
c) often a vitamin  
d) always an inorganic compound
- 2) The process of conversion of  $\text{NO}_3$  to  $\text{N}_2$  is \_\_\_\_\_.  
a) Nitrification  
b) Denitrification  
c) Ammonification  
d) Nitrogen fixation
- 3) \_\_\_\_\_ is a stress hormone.  
a) Gibberellin  
b) Ethylene  
c) Cytokinin  
d) Abscissic acid
- 4) Who proposed the idea of essential mineral nutrients of the plant?  
a) Leonhart Fuchs  
b) Aristotle  
c) Arnon and Stout  
d) Carl Linnaeus
- 5) Which of the following is trioses?  
a) Fructose  
b) Glucose  
c) Glyceraldehyde  
d) Ribose
- 6) Major function of phosphorus is in the formation of \_\_\_\_\_.  
a) Cell membranes  
b) Cell wall  
c) Enzymes  
d) Carbohydrates
- 7) Lactose is disaccharide made from \_\_\_\_\_.  
a) Glucose and galactose  
b) Fructose and galactose  
c) Glucose and ribose  
d) Glucose and fructose
- 8) Enzyme catalysing rearrangement of atomic grouping without altering molecular weight number of atom is: \_\_\_\_\_.  
a) Ligase  
b) Isomerase  
c) Oxidoreductase  
d) Hydrolase

## 08

- What is holoenzyme?
- Give any two examples of oligosaccharides.
- What are deficiency symptoms of phosphorus?
- What is ammonification?
- Role of ethylene in plant growth.
- Give any two examples of organisms showing a symbiotic nitrogen fixation.

- Q.3 Write short notes on any Two of the following. 08**
- a) Write a note on Role of micronutrient Fe and Mn.
  - b) Broad outline of nitrogen cycle.
  - c) Role of Auxin in plant growth regulation.
- Q.4 Answer any Two of the following. 08**
- a) Explain the Lock and Key hypothesis for enzyme action.
  - b) Explain the significance of biological nitrogen fixation.
  - c) Properties of polysaccharides.
- Q.5 Answer any One of the following. 08**
- a) Give the broad outline of classification of Carbohydrates.
  - b) Explain the physiological role of Gibberellins in plant growth.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**ELECTRONICS (Paper – V)**  
**Electronic Circuits**

Day & Date: Thursday, 02-03-2023  
 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 and give equations wherever necessary.  
 4) Use of lag table and calculator is allowed.

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

**08**

- 1) Most popularly used biasing method for biasing BJT is \_\_\_\_\_.  
 a) Voltage divider biasing                      b) Fixed biasing  
 c) Collector to base biasing                      d) All of these
- 2) \_\_\_\_\_ circuit reduces ripple from rectified dc voltage.  
 a) rectifier                                              b) filter  
 c) amplifier                                              d) oscillator
- 3) Efficiency of class C power amplifier is \_\_\_\_\_.  
 a) 25%                                                      b) 50%  
 c) 90                                                          d) 74
- 4) \_\_\_\_\_ is radio frequency oscillator.  
 a) phase shift oscillator                              b) Wien bridge oscillator  
 c) RC oscillator                                          d) Hartley oscillator
- 5) Stability of negative feedback amplifier is \_\_\_\_\_.  
 a) increases                                              b) decreases  
 c) remains same                                          d) none
- 6) Ripple factor of half wave rectifier is \_\_\_\_\_.  
 a) 0.48                                                      b) 1.21  
 c) 0.81                                                          d) 1.81
- 7) In BJT amplifier operating of BJT lies \_\_\_\_\_.  
 a) in cut-off region                                      b) in saturation region  
 c) in active region                                          d) below cut off region
- 8) In oscillator oscillations are sustained if phase shift between input and output is \_\_\_\_\_.  
 a) 90                                                          b) 180  
 c) 270                                                          d) 360

**Q.2 Answer Any Four of the following:**

**08**

- a) What is rectifier? What are its types?
- b) Give classification of power amplifier.
- c) What are advantages and disadvantages of negative feedback amplifier?
- d) What is biasing? What are the types of biasing?
- e) Give the classification of oscillator.

- Q.3 Write short notes on any Two of the following. 08**
- a) Zener diode as voltage regulator
  - b) Working of LC tank circuit
  - c) Fixed method of biasing
- Q.4 Answer any Two of the following. 08**
- a) Explain how input impedance increases in negative feedback amplifier?
  - b) Explain class A push pull power amplifier.
  - c) Explain construction and working of center tapped full wave rectifier.
- Q.5 Answer any One of the following. 08**
- a) Explain construction and working of RC phase shift oscillator and give the formulae of its frequency.
  - b) Explain how band width increases in negative feedback amplifier.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**GEOGRAPHY (Paper – V)**  
**Climatology**

Day & Date: Thursday, 02-03-2023  
 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 Choose the correct alternatives from the options.****08**

- 1) Climatology is a branch of \_\_\_\_\_ Geography.
  - a) Cultural
  - b) Social
  - c) Political
  - d) Physical
- 2) The Carbon dioxide present in the atmosphere is \_\_\_\_\_%.
  - a) 0.01
  - b) 0.02
  - c) 0.03
  - d) 0.04
- 3) The energy radiated from the Sun is called as \_\_\_\_\_.
  - a) Insolation
  - b) Insulation
  - c) Convection
  - d) Evaporation
- 4) The total albedo of earth surface is \_\_\_\_\_%.
  - a) 35
  - b) 45
  - c) 55
  - d) 65
- 5) The standard air pressure at sea level is \_\_\_\_\_ mb.
  - a) 1013.25
  - b) 1010.30
  - c) 109.12
  - d) 101.01
- 6) \_\_\_\_\_ is a type of planetary wind.
  - a) Trade wind
  - b) Loo
  - c) Cyclone
  - d) Tornado
- 7) \_\_\_\_\_ types of rainfall take place at equatorial belt.
  - a) Monsoon
  - b) Cyclone
  - c) Orographic
  - d) Conventional
- 8) The name hurricane is given to tropical cyclone in \_\_\_\_\_.
  - a) North Pacific Ocean
  - b) Australia
  - c) North Atlantic Ocean
  - d) Bay of Bengal

**Q.2 Answer Any Four of the following:****08**

- a) Define the concept of weather.
- b) What is doldrum?
- c) Define the Air Pressure.
- d) Define the concept of Climate.
- e) Define the concept of Monsoon.
- f) Define the concept of Cyclone.

- Q.3 Write short notes on any Two of the following. 08**
- a) Indian Monsoon
  - b) Tropical cyclone
  - c) Jet Stream
- Q.4 Answer any Two of the following. 08**
- a) Explain the types of humidity.
  - b) Explain the composition of the atmosphere.
  - c) Explain the terrestrial heat budget.
- Q.5 Answer any One of the following. 08**
- a) Explain the structure of the atmosphere.
  - b) Explain the types of planetary winds.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Paper – V)**  
**Igneous Petrology**

Day & Date: Wednesday, 15-03-2023  
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 diagram wherever necessary.

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

**08**

- 1) A glassy texture indicates \_\_\_\_\_.  
a) very rapid cooling                      b) slow cooling  
c) slow followed by rapid cooling      d) none of the above
- 2) The crystallization of three components magma can be represented by a \_\_\_\_\_ diagram.  
a) rose                                          b) histogram  
c) triangular                                d) tetragonal
- 3) \_\_\_\_\_ is the range of grain size for coarse grained igneous rock.  
a) between 2 to 5 mm                      b) below 2 mm  
c) above 5 mm                                d) below 1 mm
- 4) \_\_\_\_\_ rocks crystallized at great depth.  
a) plutonic                                    b) hypabyssal  
c) volcanic                                    d) Intrusive
- 5) In crystallization of binary magma, the melting temperature of liquid \_\_\_\_\_.  
a) lowers                                      b) Increase  
c) same                                         d) increase or decrease
- 6) Crystallization of cooling silicate melt explained by \_\_\_\_\_.  
a) N. L. Bowen                                b) Jean & Jeffary  
c) Clarke                                        d) Moulten
- 7) Well developed mineral grains of igneous rock are called \_\_\_\_\_.  
a) subhedral                                 b) euhedral  
c) anhedral                                  d) polyhedral
- 8) Granite shows \_\_\_\_\_ colour.  
a) mesocratic                                 b) melenocratic  
c) leucocratic                                 d) hypermelenocratic

**Q.2 Answer Any Four of the following:**

**08**

- a) Difference between magma and lava.
- b) Difference between concordant and Discordant Intrusion.
- c) Difference between minerals and rock.
- d) Spreading of Acidic and Basic lava.
- e) Minerals in Granite.
- f) Minerals in Basalt.



- Q.3 Write short notes on any Two of the following. 08**
- a) Ophitic and Poikilitic Texture
  - b) Vesicular and amygdaloidal Structure
  - c) Pillow and Columnar Structure
- Q.4 Answer any Two of the following. 08**
- a) Any two concordant igneous intrusions.
  - b) Ropy and flow Structure.
  - c) Composition of magma.
- Q.5 Answer any One of the following. 08**
- a) Explain Differentiation by liquid immiscibility and gaseous transfer.
  - b) Crystallization of Unicomponent and Bicomponent magma.

**B.Sc. (Semester – III) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Paper – V)**  
**Bacterial Cytology and Physiology**

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.  
3) Draw neat and labeled diagram wherever necessary.  
4) Use of logarithmic table and calculator is allowed.

08

- 1) \_\_\_\_\_ is absent in the cell wall of Gram negative bacteria.  
a) peptidoglycan                      b) Teichoic acid  
c) lipoprotein                         d) lipopolysauharide
- 2) \_\_\_\_\_ granules are called as sudanophilic granules.  
a) PHB                                  b) Volutin  
c) starch                                d) sulfur
- 3) Clostridium titani is an example of \_\_\_\_\_ spore forming organism.  
a) aerobic                              b) anaerobic  
c) facultative                         d) microaerophilic
- 4) \_\_\_\_\_ are responsible for chromosome transfers during conjugation.  
a) flagella                              b) pili  
c) sexpili                                d) cell wall
- 5) \_\_\_\_\_ is used to decrease the surface tension of media.  
a) calcium chloride                b) charcoal powder  
c) aldehyde                            d) bile salts
- 6) The type of membrane transport in which chemical modification of nutrient takes place is called \_\_\_\_\_.  
a) Active transport                 b) Passive diffusion  
c) Group translocation            d) facilitated diffusion
- 7) \_\_\_\_\_ is an example of thermophile.  
a) Bacillus                              b) Thermus aquatics  
c) E.Coli                                 d) Clostridium titani
- 8) Plasmolysis takes place when cells are suspended in \_\_\_\_\_ solution.  
a) hypotonic                          b) hypertonic  
c) isotonic                              d) water

08

- Define halophile.
- Explain sexpili.
- Define facilitated diffusion.
- Explain carboxysomes.
- Define chemotaxis.
- What is synchronous growth?

- Q.3 Write short notes on any Two of the following. 08**
- a) Effects of temperature on growth of microorganism.
  - b) Active transport.
  - c) sporulation process.
- Q.4 Answer any Two of the following. 08**
- a) Effects of osmotic pressure on growth.
  - b) Structure and functions of flagella.
  - c) Write a note on reserve food materials.
- Q.5 Answer any One of the following. 08**
- a) Define growth. Explain various methods of measurement of growth.
  - b) Describe in detail structure and function of cell wall of gram negative bacteria.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**ELECTRONICS (Paper – VI)**  
**Pulse & Switching Circuits**

Day & Date: Friday, 03-03-2023  
 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.  
 4) Use of logarithmic table and calculator is allowed.

**Q.1 Multiple Choice Questions.**

**08**

- 1) \_\_\_\_\_ is high pass circuit.
  - a) Integrator
  - b) Rectifier
  - c) Differentiator
  - d) Clamper
- 2) A transistor used as switch is operated in \_\_\_\_\_ region.
  - a) active
  - b) cut off
  - c) saturation
  - d) cut off and saturation
- 3) A free running multivibrators is also called as \_\_\_\_\_ MV.
  - a) Astable
  - b) Monostable
  - c) Bistable
  - d) none of the above
- 4) A Clipper circuit consist of \_\_\_\_\_.
  - a) Resistor, Diode
  - b) Resistor, Capacitor
  - c) Capacitor, Diode
  - d) Diode, Transistor
- 5) The UJT oscillator generate \_\_\_\_\_ type of waveforms.
  - a) Square
  - b) Triangular
  - c) Sine
  - d) Sawtooth
- 6) In monostable multivibrator using BJT, the timing components are 47 kΩ and 0.01 μF then the gate width obtained will be \_\_\_\_\_.
  - a) 32 μsec
  - b) 3.2 msec
  - c) 32 msec
  - d) 0.32 msec
- 7) IC74121 can be used as a \_\_\_\_\_.
  - a) Decoder
  - b) Multiplexer
  - c) Multivibrator
  - d) Memory
- 8) Pin no.4 of IC 555 timer is \_\_\_\_\_.
  - a) Trigger
  - b) Reset
  - c) Output
  - d) Control

**Q.2 Answer Any Four of the following:**

**08**

- a) Write any four applications of IC555.
- b) Explain the general features of time base circuit.
- c) What is multivibrator? What are its types?
- d) What is need of lime base circuit?
- e) Draw the circuit diagram of voltage controlled oscillator using IC 555.
- f) Draw the circuit diagram of integrator.

- Q.3 Write short notes on any Two of the following. 08**
- a) Action of transistor as a switch
  - b) Negative clipper circuit
  - c) IC74121
- Q.4 Answer any Two of the following. 08**
- a) Explain IC 555 as Monostable multivibrator.
  - b) Explain UJT as relaxation oscillator.
  - c) Explain Astable multivibrator using NAND gate.
- Q.5 Answer any One of the following. 08**
- a) Explain astable multivibrator by using BJT. Derive formulae for its output frequency.
  - b) Explain working of Schmitt Trigger circuit, obtain the expression for LTP and UTP.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**GEOGRAPHY (Paper - VI)**  
**Geography of India**

Day & Date: Friday, 03-03-2023  
 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.

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

**08**

- 1) \_\_\_\_\_ states of India does not share a boundary with Myanmar.  
 a) Arunachal Pradesh                      b) Assam  
 c) Manipur                                      d) Nagaland
- 2) \_\_\_\_\_ is defined the northern frontiers of India.  
 a) Himalayan mountain range              b) Karakoram Range  
 c) Aravali Range                              d) Satpura Range
- 3) \_\_\_\_\_ soil is related to the term of regur.  
 a) Laterite Soil                                  b) Black Cotton Soil  
 c) Red Soil                                      d) Deltaic Alluvial Soil
- 4) India is the \_\_\_\_\_ largest country in the world in respect to area.  
 a) Second                                      b) Third  
 c) Seventh                                      d) Ninth
- 5) In Orissa. Iron ores is located in \_\_\_\_\_ district.  
 a) Mayurbhanj                                  b) Chandrapur  
 c) Koraput                                      d) Bhubaneswar
- 6) Minerals are \_\_\_\_\_ types of resources.  
 a) Natural                                      b) Inexhaustible  
 c) Exhaustible natural                      d) Artificial
- 7) Petroleum is found under the \_\_\_\_\_.  
 a) Sedimentary rocks                      b) Water  
 c) Sand                                          d) Coke
- 8) \_\_\_\_\_ is the following an example of rabbi crops.  
 a) Bajara                                      b) Cotton  
 c) Rice                                          d) Wheat

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

**08**

- a) Define the concept of Soil.
- b) Define the concept of religion.
- c) Define the concept resources.
- d) Define the concept of Climate.
- e) Define the concept of age and sex composition.
- f) Define the concept of tribe.

- Q.3 Write short notes on any two of the following. 08**
- a) Rice distribution in India
  - b) Industrial development
  - c) Growth of population in India
- Q.4 Answer any two of the following questions. 08**
- a) Explain the distribution of population of India on the basis of religion.
  - b) Explain the Coal production of India.
  - c) Explain the types of forest in India.
- Q.5 Answer any one of the following questions. 08**
- a) Explain the Physiographic division of India
  - b) Explain the types of Soils in India

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - III) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Paper - VI)**  
**Sedimentary and Metamorphic Petrology**

Day & Date: Thursday, 16-03-2023

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.  
 3) Draw neat diagram wherever necessary.

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

- 1) Which type of sandstone has coarse grained, sub-rounded texture?
  - a) Arkose
  - b) Grit
  - c) ferruginous sandstone
  - d) argillaceous sandstone
- 2) Gneiss represents \_\_\_\_\_ Foliated fabric.
  - a) strongly
  - b) non
  - c) weakly
  - 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 > 256 mm are called \_\_\_\_\_.
  - a) gravels
  - b) pebbles
  - c) silt
  - d) boulders
- 5) The \_\_\_\_\_ sedimentary rocks are formed by deposition of sediments in standing, quiet water environment.
  - a) rudaceous
  - b) arenaceous
  - c) argillaceous
  - d) chemical
- 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)  $\text{CaCO}_3$
  - b)  $\text{MgCO}_3$
  - c)  $\text{CaCO}_3 \text{ MgCO}_3$
  - d) None of these
- 8) Which of the following shows non-foliated fabric?
  - a) Marble
  - b) Schist
  - c) Gneiss
  - d) None of these

**Q.2 Answer Any Four of the following: 08**

- a) Define Scam deposits.
- b) What is migmatites?
- c) Give the names of minerals present in eclogitefacies.
- d) Define metamorphic facies.
- e) What is Arkose?



- Q.3 Write short notes on any Two of the following. 08**
- a) Limestone
  - b) Eclogite Facies
  - c) Describe in detail 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.

**Seat  
No.**

Day & Date: Thursday, 16-03-2023  
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.

08

- 1) Transduction was discovered by \_\_\_\_\_.  
a) Griffith  
b) Zinder and Lederberg  
c) Hayes and Woolman  
d) Iwanowsky
- 2) \_\_\_\_\_ causes death of individuals.  
a) Kido mutation  
b) Sub-vital mutation  
c) Lethal mutation  
d) Antimutational changes
- 3) Okazaki fragments occur during \_\_\_\_\_.  
a) Replication  
b) Conjugation  
c) Transformation  
d) Transduction
- 4) \_\_\_\_\_ add complementary bases during replication.  
a) Helicase  
b) Ligase  
c) Synthease  
d) Polymerase
- 5) In DNA double helix the two chains are held together by \_\_\_\_\_ bonds.  
a) Covalent  
b) Ester  
c) Hydrogen  
d) Ionic
- 6) \_\_\_\_\_ is largest among the following.  
a) Nucleotide  
b) Carbon  
c) Phosphate  
d) Nitrogen base
- 7) The accepted hypotheses for DNA replication is \_\_\_\_\_.  
a) Conservative  
b) disperative  
c) Evolutionary  
d) Semi-conservative
- 8) \_\_\_\_\_ was identified as trans forming principle.  
a) DNA  
b) RNA  
c) r RNA  
d) E RNA

08

- Define phenotype
- Types of mutations
- List enzymes involved in replication
- What are cistrons and recons?
- Induced mutation.
- Define Genetic code.

- Q.3 Answer any two** **08**
- a) Base pair substitution
  - b) Dark repair mechanism
  - c) Replica plate technique
- Q.4 Answer any two** **08**
- a) Fate of exogenote
  - b) Difference between specialized and abortive transduction.
  - c) Hershey and chase experiment
- Q.5 Answer any one** **08**
- a) Mechanism of DNA replication.
  - b) Conjugation

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov - 2022**  
**CHEMISTRY (Paper - VII)**  
**Physical Chemistry**

Max. Marks: 40

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

08

- 1) An increase in the randomness suggest that the reaction is \_\_\_\_\_.  
a) endothermic                      b) spontaneous  
c) non-spontaneous                d) reversible
- 2) On dilution specific conductivity \_\_\_\_\_.  
a) decrease                          b) increase  
c) both a and b                      d) none of these
- 3) The total no of atoms per unit cell of FCC crystal is \_\_\_\_\_.  
a) 1                                      b) 2  
c) 3                                      d) 4
- 4) The Nernst's distribution law is also known as \_\_\_\_\_.  
a) Henry's law                        b) Raoult's law  
c) partition law                      d) equilibrium law
- 5) In an adiabatic expansion of an ideal gas \_\_\_\_\_.  
a)  $q = 0$                                 b)  $dT = 0$   
c)  $\Delta E = 0$                              d)  $\Delta V = 0$
- 6) For the solution of NaOH which will have the lowest value of specific conductance?  
a) 0.1M                                b) 1.0M  
c) 0.001M                             d) 0.01M
- 7) If transport number of cation is 0.52, then that of anion is \_\_\_\_\_.  
a) 0.48                                b) 0.78  
c) 1.22                                d) 0.62
- 8) Molar conductance is expressed in \_\_\_\_\_.  
a) Siemen.  $m^{-1}$                       b) S.  $m^2mol^{-1}$   
c) mhos.  $m^{-1}$                         d)  $Ohm^{-1}.m$

08

- State Kohlrausch's law.
- Define the entropy, and give its unit.
- Define the term specific conductance, mention its unit.
- Mention laws of crystallography, and explain the law of rational indices.
- Explain the term absolute entropy.
- Define Weiss and Miller indices.

- Q.3 Write short notes on any Two of the following.** **08**
- a) The specific conductance of N/50 solution of  $\text{ZnSO}_4$  at 298 K is  $0.02107 \text{ Ohm}^{-1} \text{ cm}^{-1}$ . Calculate equivalent and molecular conductances of  $\text{ZnSO}_4$  solution.
  - b) State the law of partition and give its limitations.
  - c) How is entropy change determined in fusion of solid and vaporization of liquid?
- Q.4 Answer any Two of the following.** **08**
- a) Give an account of the process of extraction.
  - b) Discuss entropy changes in reversible process.
  - c) Define transport number of an ion. Describe the moving boundary method.
- Q.5 Answer any One of the following.** **08**
- a) What is Hittorf's rule? Discuss the application of Kohlrausch's law.
  - b) What is mean by space lattice of crystal? Describe Bragg's equation for interplaner distances of crystal.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper – VII)**  
**Software Engineering**

Day & Date: Tuesday, 21-02-2023  
 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 and labeled diagram wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

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

**08**

- 1) In Systems Development Life Cycle, which phase comes after the analysis phase?
  - a) Planning phase
  - b) Design phase
  - c) Coding phase
  - d) Implementation phase
- 2) A feasibility study is used to determine the proposed systems.
  - a) Resource requirements
  - b) Costs and benefits
  - c) Availability of hardware and software
  - d) All of the above
- 3) Spiral model is developed by \_\_\_\_\_.
  - a) Roger Pressman
  - b) Berry Bohem
  - c) Victor Bisil
  - d) Bev Little Wood
- 4) \_\_\_\_\_ type of reports are required to be generated timely such as weekly, monthly, quarterly or yearly.
  - a) Future projections
  - b) External outputs
  - c) Internal outputs
  - d) Periodic outputs
- 5) In software maintenance tackling the changes in the hardware and software environment where the software works, is called \_\_\_\_\_.
  - a) Corrective
  - b) Perfective
  - c) Adaptive
  - d) Preventive
- 6) A physical DFD \_\_\_\_\_.
  - a) Has no means of showing material flow
  - b) Can show the flow of material
  - c) Does not concern itself with material flow
  - d) Can show only stored material
- 7) The smallest unit of data that provides for no further decomposition is \_\_\_\_\_.
  - a) Data element
  - b) Data dictionary
  - c) Data base
  - d) Data set
- 8) \_\_\_\_\_ is collection of data at its source means preparation of source documents by applying manual checks.
  - a) Data Collection
  - b) Recording Data
  - c) Report
  - d) Data set

**Q.2 Answer Any Four of the following:**

- a) What are the characteristics of the software?
- b) What is DFD?
- c) What is meant by software prototyping?
- d) Define Data dictionary.
- e) Define software testing.
- f) What are the advantages of Prototype model?

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

- a) Software quality - Portability and Flexibility.
- b) Black box testing.
- c) Structured chart.

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

- a) Draw ERD of Library Management System.
- b) Compare Water fall Model and Spiral model.
- c) What is Maintenance? Explain the types of Software Maintenance.

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

- a) Explain different fact finding techniques.
- b) Explain  $1NF$ ,  $2NF$ ,  $3NF$  of normalization with suitable example.

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov - 2022**  
**CHEMISTRY (Paper – VIII)**  
**Analytical & Industrial Inorganic Chemistry**

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.  
4) Use of logarithmic table and calculator is allowed.  
(At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl = 35.5)

08

- As phenolphthalein indicator is colorless in acidic medium, it is \_\_\_\_\_ colour indicator.
  - Two
  - One
  - Three
  - Four
- Solochrome black is \_\_\_\_\_ indicator.
  - Metallochromic
  - Acid base
  - Auto
  - Redox
- DMG is specific reagent for \_\_\_\_\_.
  - Aluminum
  - Magnesium
  - Nickel
  - Copper
- $\text{Fe}(\text{OH})_3$  is a \_\_\_\_\_ precipitate.
  - Amorphous
  - Crystalline
  - Curdy
  - Gelatinous
- Froth floatation method is used for concentration of \_\_\_\_\_ ores.
  - Sulphide
  - Silicates
  - Oxide
  - Carbonate
- The method of purification of a metal by using electrolysis is called \_\_\_\_\_.
  - Poling
  - distillation
  - hydrometallurgy
  - electrorefining
- The percentage of carbon in cast iron is \_\_\_\_\_.
  - 0 to 0.1
  - 2.5 to 5.00
  - 0.6 to 1.5
  - 0.1 to 0.6
- The critical temperature of iron is \_\_\_\_\_  $^{\circ}\text{C}$ .
  - 725
  - 300
  - 230
  - 850

08

- a) Define the terms.
  - i) Titrant
  - ii) Indicator
- b) Define the terms.
  - i) Nucleation
  - ii) Ignition
- c) What are the advantages of Haber's process?
- d) Draw a neat labeled diagram of L.D. process.
- e) Give the merits of contact process for the manufacture of sulphuric acid.
- f) Give the characteristics of good precipitate.



- Q.3 Write short notes on any Two of the following. 08**
- a) Physico-chemical principles of Haber's process
  - b) Froth floatation process
  - c) Heat treatments on steel
- Q.4 Answer any Two of the following. 08**
- a) Differentiate between Bessmer process & L.D. process
  - b) Distinguish between calcination and roasting
  - c) Give merits and demerits of organic precipitant
- Q.5 Answer any One of the following. 08**
- a) What is acid-base indicator? Define neutralization curve. Explain choice of indicator for titration between strong acid strong base with help of neutralization curve.
  - b) Explain the role of DMG and oxine in gravimetric analysis.

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper – VIII)**  
**Database Management System**

Max. Marks: 40

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

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

08

- 1) To list tables in a MySQL database \_\_\_\_\_ command is used.  
a) Display Tables                      b) Show Tables  
c) List Tables                          d) Select
- 2) \_\_\_\_\_ level describes the structure of the whole database for a group of users.  
a) Physical                                b) External  
c) Conceptual                             d) None of these
- 3) DML stands for \_\_\_\_\_.  
a) Data Manipulation Language        b) Data Manual Language  
c) Data Menu Language                d) Data Main Language
- 4) \_\_\_\_\_ statement is used for updating existing information in the table.  
a) Insert                                  b) Alter Table  
c) Delete                                 d) Update
- 5) \_\_\_\_\_ is the characteristics of transactions.  
a) Atomicity                              b) Durability  
c) Isolation                                d) All of the mentioned
- 6) In hierarchical model, data is organized into \_\_\_\_\_.  
a) logical structure                      b) physical structure  
c) tree like structure                    d) none of them
- 7) User which interacts with the system using database query language is called as \_\_\_\_\_.  
a) Sophisticated user                    b) Naive user  
c) Specialized user                      d) Application Programmer
- 8) \_\_\_\_\_ SQL keyword is used to retrieve a maximum value.  
a) Max                                      b) Top  
c) Upper                                    d) None of these

**Q.2 Answer Any Four of the following:**

08

- What is schema?
- List numeric data types in MySQL.
- Write syntax of insert into command.
- Define DBMS?
- Write a different attributes of explicit cursor.
- State components of DBMS.

- Q.3 Write short notes on any Two of the following. 08**
- a) Transaction states.
  - b) Write a note on codd's rules.
  - c) Write a note on View.
- Q.4 Answer any Two of the following. 08**
- a) What is relational algebra? Explain select and project in details.
  - b) What is concurrency control? What are the different problems of concurrency control?
  - c) What is the use of primary key? How to use it.
- Q.5 Answer any One of the following. 08**
- a) What is trigger? Explain types of trigger in details with example.
  - b) What is join? Explain types of join in details.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- 8) In double refraction doubly refracted rays are \_\_\_\_\_.  
 a) both are unpolarized  
 b) both are circularly polarized  
 c) both are plane polarized  
 d) Only ordinary ray is plane polarized

**Q.2 Answer the following questions. (Any Four) 08**

- Define plane of vibration and plane of polarization.
- Define Resolving power of an optical instrument. State Rayleigh's Criterion for resolution.
- What is Zone plate? How is it constructed?
- State the four points of superiority of Fabry-Perot interferometer over Michelson's interferometer.
- 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.
- Compare Geometrical and Spectral Resolution (any two points)

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

- Obtain the relation between the lateral, longitudinal and angular magnifications.
- Show that area of each half period zones are equal.
- State any eight advantages of Optical fibre.

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

- Show that for a lens system, the distance between the principal points is equal to the distance between the nodal points. Also prove that the principal and nodal points coincide if the medium on both sides of the system is same.
- Explain the formation and working of Fibre- optic communication system.
- A plane diffraction grating has a width of 2.54 cm and grating element of  $3.333 \times 10^{-3}$  cm. Explain if  $D_1$  and  $D_2$  lines of sodium of wavelength  $5890 \text{ \AA}$  and  $5896 \text{ \AA}$  will be resolved by the grating in i) the first order, ii) the second order spectrum.

**Q.5 Answer 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. When a thin film of glass ( $\mu = 1.6$ ) is interposed in the path of one of the interfering beams of a Michelson's interferometer, a shift of 20 fringes of sodium light ( $\lambda = 5893 \text{ \AA}$ ) is observed across the field of view. Calculate the thickness of the film.

**Seat  
No.**

## Max. Marks: 40

08

- 1) What is the net gain through the beta oxidation of palmitic acid?

a) 131 ATP                      b) 130 ATP  
c) 129 ATP                     d) 132 ATP
- 2) \_\_\_\_\_ buffer system is a prominent buffer system of blood.

a) Protein                        b) Phosphate  
c) Haemoglobin                d) Bicarbonate
- 3) Oxidative phosphorylation means production of ATP by \_\_\_\_\_.

a) Calvin cycle                  b) Respiration  
c) Glycolysis                    d) Glycogenolysis
- 4) Biological value of protein (BV) refers to the percentage of absorbed \_\_\_\_\_ retained by the body.

a) Hydrogen                      b) Carbon  
c) Peptide                        d) Nitrogen
- 5) Body regulates acid base balance by maintaining its blood pH \_\_\_\_\_.

a) 9.4                                b) 8.4  
c) 6.4                                d) 7.4
- 6) The electron transport chain and ATP synthesis system are situated on the \_\_\_\_\_.

a) nuclear envelope              b) Chromosomes  
c) inner mitochondrial membrane    d) lysosomes
- 7) BMR is elevated in \_\_\_\_\_.

a) under nutrition                  b) Starvation  
c) Hypothyroidism                  d) Hyperthyroidism
- 8) During which condition, beta oxidation is stimulated?

a) Well fed conditions              b) Starvation  
c) Both                                d) None of the above

## 08

- What are Sources of the atoms in the purine?
- What are disorders of acid-base balance?
- Which are the inhibitors of electron chain transfer?
- Define transamination and deamination.
- How blood pH is maintained in body?
- What do you mean by lipid metabolism?

- Q.3 Write short note on any two of the following. 08**
- a) What is BMR? Write factors affecting BMR and its significance.
  - b) Write note on exergonic and endergonic reactions.
  - c) Write note on ethanol fermentation.
- Q.4 Answer any two of the following. 08**
- a) What is oxidative phosphorylation? Write mechanism of oxidative phosphorylation.
  - b) Explain  $\beta$ -oxidation of palmitic acid.
  - c) Write note on bicarbonate and phosphate blood buffer system in body.
- Q.5 Answer any ONE of the following. 08**
- a) Write a note on biological value, essential and non-essential amino acids, nitrogen balance.
  - b) Write note on TCA cycle and its energetic.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**PLANT PROTECTION (Paper – VII)**  
**Introduction to weeds & non insect pests**

Day & Date: Thursday, 23-02-2023  
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 and give equations wherever necessary.

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

08

- 1) Weeds are \_\_\_\_\_ to human being and animal.  
a) Harmful                                      b) Useful  
c) Superior                                     d) None of these
- 2) Cyperus rotundus is \_\_\_\_\_.  
a) Xerophytic weed                          b) Aquatic weed  
c) Mesophytic weed                        d) Parasitic weed
- 3) \_\_\_\_\_ is xerophytic weed plant.  
a) Typha sp.                                    b) Cyperus sp.  
c) Argemone Mexicana                      d) Solanum sp.
- 4) Parthenium hysteroporous belongs to family \_\_\_\_\_.  
a) Solanaceae                                  b) Asteraceae  
c) Pappaveraceae                            d) Malvaceae
- 5) Euphorbia hirta produce \_\_\_\_\_.  
a) Steroids                                      b) Flavonoids  
c) Sugars                                        d) Milky latex
- 6) Cynodon dactylon is a \_\_\_\_\_ weed plant.  
a) Monocot                                      b) Dicot  
c) Poisonous                                    d) None of these
- 7) 2,4-D stands for \_\_\_\_\_.  
a) 2,4- Dichlorophenoxy Acetic acid  
b) 2,4- Dichlorophenols  
c) Dichlorophenoxy acid  
d) 2,4- Dihydroxy Acetic acid
- 8) Effective time of weedicide spraying is \_\_\_\_\_.  
a) Afternoon                                    b) Late morning  
c) Early morning                                d) Mid night

**Q.2 Answer the following questions. (Any Four)**

08

- 1) Give any four loss reasons, caused by weed growth.
- 2) What is field sanitation?
- 3) How the ploughing takes place?
- 4) How will you manage the attack of birds on grapevineyard?
- 5) Why the snails and slugs are non-beneficial?
- 6) Give the loss, caused by rats in storage and field.



- Q.3 Answer the following questions. (Any Two)** **08**
- 1) Parasitic weeds
  - 2) Crop rotation
  - 3) Management of phytopathogenic nematodes.
- Q.4 Answer the following questions. (Any Two)** **08**
- 1) Give the properties, mode of action, formulation and use of Mira-71.
  - 2) Write in brief classification of weeds based on-ecology.
  - 3) What is mulching?
- Q.5 Answer the following questions. (Any One)** **08**
- a) Describe the gross morphology, reproduction, ecology, dispersal and management of weed *Cynodon dactylon*.
  - b) Describe the gross morphology, reproduction, ecology, dispersal and management of weed *Argemone Mexicana*.

Set P

- Q.3 Write short note on any two of the following. 08**
- 1) Nuclear fission
  - 2) Compton wavelength
  - 3) Wave Packets
- Q.4 Answer any two of the following. 08**
- 1) Obtain an expression for wavelength of matter wave.
  - 2) Describe the experimental verification of Compton effect.
  - 3) Write note on neutron induced reactions.
- Q.5 Answer any ONE of the following. 08**
- a) Explain various quantum numbers associated with vector atom model.
  - b) Derive the mass-energy relation.

| Set | P |
|-----|---|
| 1   | 1 |
| 2   | 1 |
| 3   | 1 |
| 4   | 1 |
| 5   | 1 |
| 6   | 1 |
| 7   | 1 |
| 8   | 1 |
| 9   | 1 |
| 10  | 1 |
| 11  | 1 |
| 12  | 1 |
| 13  | 1 |
| 14  | 1 |
| 15  | 1 |
| 16  | 1 |
| 17  | 1 |
| 18  | 1 |
| 19  | 1 |
| 20  | 1 |
| 21  | 1 |
| 22  | 1 |
| 23  | 1 |
| 24  | 1 |
| 25  | 1 |
| 26  | 1 |
| 27  | 1 |
| 28  | 1 |
| 29  | 1 |
| 30  | 1 |
| 31  | 1 |
| 32  | 1 |
| 33  | 1 |
| 34  | 1 |
| 35  | 1 |
| 36  | 1 |
| 37  | 1 |
| 38  | 1 |
| 39  | 1 |
| 40  | 1 |
| 41  | 1 |
| 42  | 1 |
| 43  | 1 |
| 44  | 1 |
| 45  | 1 |
| 46  | 1 |
| 47  | 1 |
| 48  | 1 |
| 49  | 1 |
| 50  | 1 |
| 51  | 1 |
| 52  | 1 |
| 53  | 1 |
| 54  | 1 |
| 55  | 1 |
| 56  | 1 |
| 57  | 1 |
| 58  | 1 |
| 59  | 1 |
| 60  | 1 |
| 61  | 1 |
| 62  | 1 |
| 63  | 1 |
| 64  | 1 |
| 65  | 1 |
| 66  | 1 |
| 67  | 1 |
| 68  | 1 |
| 69  | 1 |
| 70  | 1 |
| 71  | 1 |
| 72  | 1 |
| 73  | 1 |
| 74  | 1 |
| 75  | 1 |
| 76  | 1 |
| 77  | 1 |
| 78  | 1 |
| 79  | 1 |
| 80  | 1 |
| 81  | 1 |
| 82  | 1 |
| 83  | 1 |
| 84  | 1 |
| 85  | 1 |
| 86  | 1 |
| 87  | 1 |
| 88  | 1 |
| 89  | 1 |
| 90  | 1 |
| 91  | 1 |
| 92  | 1 |
| 93  | 1 |
| 94  | 1 |
| 95  | 1 |
| 96  | 1 |
| 97  | 1 |
| 98  | 1 |
| 99  | 1 |
| 100 | 1 |

Max. Marks: 40

08

08

- Q.3 Write short notes on any two of the following. 08**
- a) Write note on specific activity and turn over number.
  - b) Write applications of bioinformatics.
  - c) Explain agents causing cancer.
- Q.4 Answer any two of the following. 08**
- a) Write note on regulation of gene expression.
  - b) Explain natural course of Aids.
  - c) Write the structure of insulin and mechanism of action of insulin.
- Q.5 Answer any one of the following. 08**
- a) Explain significance of  $K_m$  and  $V_{max}$ . Write note on Lineweaver Burk plot.
  - b) What is natural and acquired immunity? Explain clonal selection theory for formation of antibodies.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**PLANT PROTECTION (Paper - VIII)**  
**Insect Pests and Their Management**

Day & Date: Friday, 24-02-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

**Instructions:** 1) All questions are compulsory.  
 2) Draw a well diagram wherever necessary.  
 3) All question carry equal marks.

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

- 1) Developmental stage from birth to adult is called \_\_\_\_\_.  
 a) Gametogenesis                      b) Metamorphosis  
 c) Homogenises                      d) Evolution
- 2) Carbamates include  
 a) Fungicides, herbicides and insecticides  
 b) Insecticides only  
 c) Herbicides, insecticides and nematocides  
 d) Insecticides, nematocides and rodenticides
- 3) Rocker Sprayer is also called as.  
 a) Knapsack Sprayer                      b) Hand sprayer  
 c) Gator Pump                      d) Spray guns
- 4) Cultural controls of insects include which of the following  
 a) crop rotation                      b) tillage methods  
 c) resistant or tolerate varieties                      d) all of the above
- 5) The use of legislative restriction to control pests is called:  
 a) plant quarantine                      b) Plant law  
 c) Plant enclosure                      d) Plant protection
- 6) \_\_\_\_\_ Scientific name of stem borer.  
 a) *Chillo zonellus*                      b) *Heliothis armigera*  
 c) *Sitophilus oryzae*                      d) *Chrotogonus trachypnus*
- 7) \_\_\_\_\_ legs and \_\_\_\_\_ wings present in insect body.  
 a) 3 pairs & 2 pairs                      b) 2 pairs & 3 pairs  
 c) 3 pairs & 3 pairs                      d) 2 pairs & 2 pairs
- 8) Insect body divided into \_\_\_\_\_ parts.  
 a) 3                      b) 6  
 c) 2                      d) 4

**Q.2 Answer the following questions. (Any Four)****08**

- a) Metamorphosis.
- b) Mention two name of stored grain insect pest.
- c) Write the classification of insecticides.
- d) Write any two chemical pest control.
- e) Mention nature of formulation in the pest management.
- f) Write the host plants of stem borer.

- Q.3 Write short note on any two of the following. 08**
- a) Nature of damage of fruit borer.
  - b) Control measures of trips of rose plant
  - c) Repellents
- Q.4 Answer any two of the following. 08**
- a) General characters of typical insect pest.
  - b) Give an account on classification of insect pest.
  - c) Write the principles of insect pest control.
- Q.5 Answer any ONE of the following. 08**
- a) Describe in details about pulse beetle.
  - b) Give an account on Woolly aphids of sugarcane.

Max. Marks: 40

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

- 1) If  $X \sim G(5, 1)$  then the p. d. f. of X is same as that of an exponential variate with mean \_\_\_\_\_.  
a) 0.2                                      b) 5  
c) 1                                          d) 2.5
- 2) If  $X \sim \beta_1(2,3)$  then  $E(X) =$  \_\_\_\_\_.  
a) 0.4                                      b) 0.04  
c) 0.25                                    d) 0.15
- 3) If  $X \sim U(4, 16)$  then  $\text{Var}(X)$  is \_\_\_\_\_.  
a) 20                                        b) 12  
c) 10                                        d) 8
- 4) If  $X \sim N(60, 9)$  then the height of the normal probability curve is highest at \_\_\_\_\_.  
a) 51                                        b) 60  
c) 0                                          d) 69
- 5) Moment generating function of the Chi-square distribution is \_\_\_\_\_.  
a)  $(1 - 2t)^{n/2}$                               b)  $(1 - 2t)^{-n/2}$   
c)  $(1 - t)^{-n/2}$                              d) none of these
- 6) Student's t distribution is given by \_\_\_\_\_.  
a) G.W. Snedecor                        b) R.A. Fisher  
c) W.S. Gosset                            d) Karl Pearson
- 7) If  $F \sim F(4, 8)$  then mode of X is \_\_\_\_\_.  
a) 0.5                                        b) 0.4  
c) 0.8                                        d) 4
- 8) If  $X \sim \exp(\theta)$  then \_\_\_\_\_.  
a) mean = variance                        b) mean = standard deviation  
c) mean < variance                        d) none of these

08

- 1) If  $X \sim G(\alpha, \lambda)$  then what is the distribution of  $CX$ , if  $C$  is a positive constant?
- 2) Write m.g.f. of a chi square variate with  $n$  d.f.
- 3) Define beta distribution of 2<sup>nd</sup> kind.
- 4) Define an  $F$  variate with  $n_1, n_2$  d.f.
- 5) Define exponential distribution.
- 6) State relation between  $F$  and  $t$  variates.



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

- 1) Find mean of gamma distribution with parameter  $(\alpha, \lambda)$ .
- 2) If  $X$  is a r. v. with p.d.f.  $f(x) = \theta e^{-\theta x} ; x > 0, \theta > 0$   
 $= 0 ; \text{ otherwise}$   
find the distribution of  $Y = \theta X$
- 3) Find mode of chi-square distribution with  $n$  d.f.

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

- 1) If  $F \sim F(n_1, n_2)$  distribution, then find the distribution of  $\frac{1}{F}$
- 2) Find median of normal distribution.
- 3) If  $X \sim U(-3, 2)$  then find a) mean b)  $P(|X| \leq 2)$

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

- a) Find mean and variance of beta distribution of first kind.
- b) State and prove relation between  $F$  and  $\chi^2$  distribution.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.3 Write short notes on any Two of the following. 08**
- a) What are rotational forces?
  - b) Human comfort.
  - c) Effects of local wind.
- Q.4 Answer any Two of the following. 08**
- a) Explain the importance of climatic studies in industrial development.
  - b) State the importance of temperature in physiological response.
  - c) Write the effect of urban climate on body comfort.
- Q.5 Answer any One of the following. 08**
- a) Describe the importance of weather in transportation.
  - b) Explain the method of weather forecasting.

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**GEO-CHEMISTRY (Paper – III)**  
**Principles of Geochemistry**

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 and labeled diagram wherever necessary.

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

- The example of aromatic compound is \_\_\_\_\_.  
a) Naphthalene  
b) Ethane  
c) Butane  
d) Ethylene
- In Van't Hoff isotherm, when \_\_\_\_\_ the reaction moves in backward direction.  
a)  $\Delta G > 0$   
b)  $\Delta G < 0$   
c)  $\Delta G = 0$   
d)  $\Delta G$  is absent
- In conjugate acid-base pair, there is a difference of \_\_\_\_\_.  
a) only one proton  
b) two protons  
c) no protons  
d) one proton and one -OH group
- Which of the following are the primary causes of water pollution?  
a) plants  
b) human activities  
c) animals  
d) none of these
- Lechatalier's principle is not affected on \_\_\_\_\_.  
a) concentration  
b) temperature  
c) pressure  
d) catalyst
- \_\_\_\_\_ are the most abundant organic-rich sedimentary rock.  
a) Coals  
b) amines  
c) alcohols  
d) aldehydes
- Full form of TDS is \_\_\_\_\_.  
a) Tax Deducted at Source  
b) Total Dissolved Sample  
c) Total Diffused Solid  
d) Total Dissolved solid
- Chemical equilibrium is independent of \_\_\_\_\_.  
a) time  
b) temperature  
c) pressure  
d) concentration

**Q.2 Answer Any Four of the following:** **08**

- What is chemical equilibrium?
- What are the reducing agents? Write example.
- What are the types of water pollution?
- What are acids and bases?
- Write on origin of petroleum.
- What is law of mass action?

- Q.3 Write short notes on any Two of the following. 08**
- a) Explain treatment on water pollutant by chemical oxygen demand (COD).
  - b) Write note on organic matter in black shale.
  - c) Write note on hydrolysis of  $\text{Na}_2\text{CO}_3$ .
- Q.4 Answer any Two of the following. 08**
- a) Write note on biological oxygen demand (BOD).
  - b) Write note on organic reactions.
  - c) Explain the effect of temperature on chemical equilibrium.
- Q.5 Answer any One of the following. 08**
- a) What are the geological uses of acids and bases? Explain estimation of ionic concentration.
  - b) Explain Le chatelier's rule, stability, Van't Hoff isotherm equation.

**Seat  
No.**

Day & Date: Saturday, 25-02-2023  
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

08

- Q.2 Answer the following questions. (Any Four)**

08

- 1) Write biological significance of lipids.
- 2) What is primary structure of protein.
- 3) Define polysaccharides.
- 4) What are cofactor of enzyme.
- 5) What is DNA melting and what is DNA renaturation?
- 6) Define immunoglobulin

- Q.3 Write short note on any two of the following. 08**
- 1) Define carbohydrates and add note on biological significance of carbohydrates.
  - 2) Write general properties of amino acids.
  - 3) Discuss on IgG type of immunoglobulin.
- Q.4 Answer any two of the following. 08**
- 1) Write on factors affecting enzyme actions.
  - 2) Discuss in brief structure of B- DNA type.
  - 3) Write note on structure of mRNA.
- Q.5 Answer any one of the following. 08**
- a) Describe in detail typical structure of antibody.
  - b) Explain in detail enzyme inhibition.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|



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

- a) Define
  - i) Population
  - ii) Sample
- b) Define Null hypothesis.
- c) Define C. B. R.
- d) Define central limit theorem
- e) State Chebyscheve's inequality

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

- a) Describe the procedure to test for testing population mean  $\mu = \mu_0$  based on t-distribution.
- b) A r.v.  $X$  is such that  $E(X) = 3$  and  $E(X^2) = 13$ .
  - i) Find least value for  $P(|X - 3| < 4)$
  - ii) Determine lower bound for  $P(-2 < X < 8)$
- c) Write a note on moving average method.

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

- a) Describe chi-square test of goodness of fit.
- b) Describe F test for testing equality of two population variances.
- c) Define Gross Reproduction Rate (GRR) and Net Reproductive Rate (NRR).

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

- a) Describe least square method for trend estimation.
- b) Describe the procedure for testing  $H_0: \mu = \mu_0$  and  $H_0: \mu_1 = \mu_2$  based on normal distribution.

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**METEOROLOGY (Paper – IV)**  
**Meteorological Instruments**

Max. Marks: 40

- Page 1 of 2

- Q.2 Answer any four of the following** **08**
- a) Draw neat diagram of ordinary rain gauge.
  - b) Calculate the common temperature indicated by thermometers calibrated in Celsius scale and Fahrenheit scale.
  - c) How atmospheric pressure is measured using Fortin's barometer?
  - d) Two unknown wind velocities 40 km/hr and 60 km/hr are measured using a cup anemometer and the respective linear velocities of rotating caps are 25 m/s and 40m/s. Determine constants of the cup anemometer.
  - e) With neat diagram explain wind vane.
  - f) What is thermopile?
- Q.3 Write short notes on any two of the following.** **08**
- a) With neat diagram explain construction and working of float gauge.
  - b) Write a note on mercury thermometer.
  - c) Calculate atmospheric pressure in mb if reading of Fortin's barometer is 27 inches.  
(Given: density of Hg=13.6 g/cc)
- Q.4 Answer any two of the following.** **08**
- a) Draw neat labelled diagram of Aneroid barometer and describe its construction and working.
  - b) With neat diagram explain construction and working of Hooke's anemometer.
  - c) With neat diagram explain construction and working of dry and wet bulb thermometers.
- Q.5 Answer any one of the following.** **08**
- a) With neat diagram explain construction and working of automatic siphon gauge.
  - b) With neat labelled diagram, describe maximum and minimum thermometer.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**GEO-CHEMISTRY (Paper – IV)**  
**Chemistry of the Earth**

Day & Date: Monday, 27-02-2023  
 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 indicates full marks.

**Q.1 Fill in the blanks with correct answer from given options. 08**

- 1) The Eh - Ph diagrams were first proposed by
  - a) Krumbien & Garrel
  - b) Sloss & Garret
  - c) Pettijohn
  - d) None of the above
- 2) The degree of hydration depends on the:
  - a) Size of the ion
  - b) Intensity of the charge on its surface
  - c) Shape of the ion
  - d) Both a and b
- 3) 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
- 4) The swelling and shrinkage properties of soil are due to
  - a) Kaolinite
  - b) Halloysite
  - c) Montmorillonite
  - d) None of these
- 5) Goldsmith has classified clay mineral as \_\_\_\_\_.
  - a) Resistates
  - b) Hydrolysates
  - c) Oxidates
  - d) Evaporates
- 6) The most stable form of manganese in the secondary environment is \_\_\_\_\_.
  - a) Psilomelane
  - b) Pyrolusite
  - c) Hausmanite
  - d) Manganite
- 7) Soil pollution is caused by \_\_\_\_\_.
  - a) Industrial Activity
  - b) Agricultural Activities
  - c) Accidental Oil Spills
  - d) All of above
- 8) Which of the following agents is responsible for turning the TajMahal yellow?
  - a) Sulphur
  - b) Chlorine
  - c) Sulphur dioxide
  - d) Nitrogen dioxide

**Q.2 Answer the following questions. (Any Four) 08**

- a) Define Pollution.
- b) What is hydrogen ion concentration in pure water at 25°C?
- c) What is mean by radiogenic isotopes?

- d) List the air pollutants.
- e) Which of the following radioactive isotopes has the longest half-life?
- f) Name the factors controlling the formation of soil.

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

- a) Explain in brief the characteristic of Kaolinite clay mineral.
- b) Discuss in short Oxidation Reduction potential in sedimentation process.
- c) Write note on Geochemical cycle.

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

- a) Explain the causes of soil pollution.
- b) Discuss the structural units of clay minerals with neat labeled diagram.
- c) Write the applications of radiogenic isotopes.

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

- a) Define chemical weathering. Explain the different processes of chemical weathering.
- b) Describe in detail the factors controlling the formation of soil.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

## Animal Physiology: Controlling and Coordinating Systems

Max. Marks: 40

Time: 03:00 PM To 05:00 PM

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

## 08

- 1) Adrenal gland is located close to \_\_\_\_\_ organ.  
a) Trachea                                      b) Liver  
c) Stomach                                      d) Kidney
- 2) Fertilization step in IVF process take place in \_\_\_\_\_.  
a) Fallopian tube                                b) In Laboratory  
c) Inside Cervix                                 d) In Uterus
- 3) Development of mammary gland and formation of milk is the function of \_\_\_\_\_.  
a) Oxytocin                                      b) Growth Hormone  
c) Prolactin                                      d) Progesterone
- 4) \_\_\_\_\_ hormone is also called as ‘pregnancy hormone’.  
a) Progesterone  
b) Estrogen  
c) Human Chorionic Gonadotrophin (hCG)  
d) Prolactin
- 5) \_\_\_\_\_ cycle involves regular appearance of menses due to the shedding of the endometrial lining of the uterus.  
a) Estrous cycle                                  b) Menstrual cycle  
c) Circadian cycle                                d) Lunar cycle
- 6) \_\_\_\_\_ type of muscles are line the gastrointestinal tract.  
a) Cartilagenos Muscles                        b) Skeletal Muscle  
c) Smooth Muscle                                d) Cardiac Muscle
- 7) Islet of Langerhans are seen in the histology of \_\_\_\_\_ organ.  
a) Testis                                          b) Stomach  
c) Liver                                          d) Pancreas
- 8) Interstitial cell of Leydig are found in the histology of \_\_\_\_\_ gland.  
a) Ovary                                          b) Testes  
c) Salivary                                        d) Pancreas

## 08

- Write any two functions of blood.
- Write any two functions of pancreas.
- Differentiate between vasectomy and tubectomy.
- Define synapse and its function.
- Write on testosterone hormone and its one function.
- Define IVF and its one significance.

- Q.3 Write note on any two of the following. 08**
- a) Give an account on types of blood cells
  - b) Write a brief account on histology of liver
  - c) Write a note on ultrastructure of neuron
- Q.4 Attempt the following. 08**
- a) Write a detailed account on the ultra structure of skeletal muscle and molecular and chemical basis of muscle contraction.
  - b) Explain in detail histology, hormones secreted and their functions of thyroid and parathyroid gland.
- Q.5 Answer any one of the following. 08**
- a) Describe ultrastructure of neuron and add a note on generation and transmission of action potential.
  - b) Give a detailed account on pituitary gland and its hormones.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Paper-VII)**  
**Differential Equations**

Day & Date: Tuesday, 28-02-2023  
 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 (each 1 mark)**

**08**

- 1) The solution of  $p(p-1) = 0$  is \_\_\_\_\_  
 a)  $(y-c)(y-x-c) = 0$                       b)  $(y-c)(x-c) = 0$   
 c)  $(y-c)(y+x+c) = 0$                       d)  $(y+c)(y+x) = 0$
- 2) The solution of the differential equation  $y = px + f(p)$  is \_\_\_\_\_  
 a)  $y = cx - f(c)$                                   b)  $y = cx + f(x)$   
 c)  $y = cx + f(c)$                                   d)  $y = px + f(c&)$
- 3) One of the solution of the equation  $\frac{dx}{z} = \frac{dy}{-z} = \frac{dz}{z^2(x+y)^2}$  is \_\_\_\_\_  
 a)  $x - y = c_1$                                       b)  $x + y = c_1$   
 c)  $x^2 + y^2 = c_1$                                       d)  $x^2 - y^2 = c_1$
- 4) The differential equation of the form  $Pdx + Qdy + Rdz = 0$  where  $P, Q, R$  are function of  $x, y, z$  are called \_\_\_\_\_ equations.  
 a) Linear differential                                  b) Homogeneous linear  
 c) Simultaneous                                      d) Total differential
- 5) The P.I. of the equation  $x^2 \frac{d^2y}{dx^2} + y = 3x^2$  is \_\_\_\_\_.  
 a)  $x^2$                                                       b)  $x$   
 c)  $(\log x)^2$                                               d)  $\log x$
- 6) One of the solution of the simultaneous equations  $\frac{dx}{y-z} = \frac{dy}{z-x} = \frac{dz}{x-y}$  is \_\_\_\_\_ equations  
 a)  $xyz = c_1$                                               b)  $x + y + z = c_1$   
 c)  $x^2yz = c_1$                                               d)  $x - y + z = c_1$
- 7) The number of arbitrary constant in the general solution of the differential equation  $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$  is/are \_\_\_\_\_  
 a) One                                                      b) Two  
 c) Three                                                      d) Four
- 8) If  $y = e^x$  is known solution of C.F. of the differential equation  $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$  then \_\_\_\_\_  
 a)  $1 + Px + Qx^2 = 0$                                   b)  $1 + P - Q = 0$   
 c)  $1 - P + Q = 0$                                       d)  $1 + P + Q = 0$



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

- a) Solve  $P^2 + P - 6 = 0$
- b) Solve  $(P - 1)(y - Px) = P$
- c) Solve  $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - 4y = 0$
- d) Solve  $\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z}$
- e) Show that the given equation is integrable  

$$(2x + y^2 + 2xz)dx + 2xydy + x^2dz = 0$$
- f) Solve  $y = 2px + \tan^{-1}(p^2x)$

**Q.3 Answer any Two of the following**

08

- a) Solve  $y + Px = P^2$  using solvable for  $y$
- b) Solve  $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - 4y = x^2$
- c) Solve  $\frac{d^2y}{dx^2} - \cot x \frac{dy}{dx} + \sin^2 xy = \cos x - \cos^3 x$

**Q.4 Answer any Two of the following**

08

- a) Solve  $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$
- b) Solve  $2xdx + 2ydy + (x^2 + y^2 + e^z)dz = 0$
- c) Solve  $P = \tan\left(x - \frac{P}{(1+P^2)}\right)$

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

08

- a) Solve  $x^3 \frac{d^3y}{dx^3} + 2x^2 \frac{d^2y}{dx^2} + 2y = 10\left(x + \frac{1}{x}\right)$
- b) Solve  $x \frac{d^2y}{dx^2} - 2(x+1) \frac{dy}{dx} + (x+2)y = (x-2)e^{zx}$

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Paper – VII)**  
**Plant Physiology**

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.  
4) Use of logarithmic table and calculator is allowed.

08

- Aerobic respiration is carried out in presence of \_\_\_\_\_.  
a) CO<sub>2</sub>                                      b) NO<sub>2</sub>  
c) SO<sub>2</sub>                                        d) O<sub>2</sub>
- When CO<sub>2</sub> concentration is very low and O<sub>2</sub> concentration is very high then \_\_\_\_\_ takes place.  
a) C<sub>3</sub> cycle                                  b) C<sub>4</sub> cycle  
c) C<sub>2</sub> cycle                                  d) C<sub>5</sub> cycle
- During respiration final oxidation of NADH occurs in \_\_\_\_\_.  
a) Glycolysis                                b) Link reaction  
c) TCA cycle                                 d) ETC
- In TCA cycle Oxaloacetate condense with Acetyl Co-A to yield \_\_\_\_\_.  
a) Fumaric acid                              b) Succinic acid  
c) Malic acid                                 d) Citric acid
- \_\_\_\_\_ enzyme helps to fix CO<sub>2</sub> in C<sub>3</sub> cycle.  
a) PEase                                        b) Transaminase  
c) Rubisco                                     d) Carboxypeptidase
- C<sub>3</sub> cycle is also known as \_\_\_\_\_.  
a) Krebs cycle                                b) Calvin cycle  
c) EMP pathway                             d) None of these
- \_\_\_\_\_ transport usually does not require energy.  
a) symplastic                                 b) apoplastic  
c) both a & b                                 d) none of these
- Mass flow hypothesis is also called \_\_\_\_\_ flow hypothesis.  
a) food                                         b) ion  
c) pressure                                    d) salt

08

- Define Long Day Plants. Give any two examples.
- Define Short Day Plants. Give any two examples.
- Define symplastic transport.
- Enlist the different photosynthetic pigments.
- Define vernalization.
- What is sink?

- Q.3 Write short notes on any Two of the following. 08**
- a) Explain role of phytochrome.
  - b) Write a note on - Apoplastic transport.
  - c) Write a note on - Mass flow hypothesis.
- Q.4 Answer any Two of the following. 08**
- a) Write a note on - Structure of Mitochondrion.
  - b) Write a note on - Significance of photorespiration.
  - c) Write a note on - Structure of Photosynthetic apparatus.
- Q.5 Answer any One of the following. 08**
- a) Explain in detail - Process of Glycolysis.
  - b) Explain in detail - C3 cycle of photosynthesis.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

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

- a) Show that a set  $G = \{1, -1, i, -i\}$  of a complex number form a group under complex multiplication.
- b) Let  $p, q$  be two positive integers then  $\gcd(p, q), \text{lcm}(p, q) = pq$ .
- c) Prove that every isomorphic image of cyclic group is cyclic.

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

- a) Explain product of two permutation and inverse permutation.
- b) If  $f: G \rightarrow G'$  be an onto group homomorphism then  $G'$  is isomorphic to a quotient group  $G$  (i.e.  $G' \cong G / \ker f$ )
- c) Prove that a group  $G$  is abelian if and only if  $a^2b^2 = (ab)^2$  for all  $a, b \in G$

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

- a) Show that  $GL(2, R) = \left\{ \begin{bmatrix} a & b \\ c & d \end{bmatrix} / a, b, c, d \in R \right\}$  be the set of two by two matrix such that  $\begin{vmatrix} a & b \\ c & d \end{vmatrix} \neq 0$  is a group under matrix multiplication.
- b) State and prove Cayley theorem.

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**Botany (Paper – VIII)**  
**Embryology of Angiosperms**

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 and labeled diagram wherever necessary.

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

- 1) Transfer of pollen to the stigma of another flower of the same plant is \_\_\_\_\_.  
a) autogamy                                      b) allogamy  
c) xenogamy                                     d) geitonogamy
- 2) In coconut plant, the fruit dispersal is due to \_\_\_\_\_.  
a) epicarp                                        b) fibrous mesocarp  
c) endocarp                                      d) endosperm
- 3) *Xanthium* fruits are dispersed by \_\_\_\_\_.  
a) wind                                          b) water  
c) animal                                        d) explosive
- 4) Fully matured normal type of monosporic embryo sac shows- \_\_\_\_\_ structure.  
a) 7 celled                                      b) 8 celled  
c) 4 celled                                        d) 16 celled
- 5) Entry of pollen tube through micropylar canal called \_\_\_\_\_.  
a) chalazogamy                                b) misogamy  
c) porogamy                                     d) all of these
- 6) The development of embryo in *Capsella bursa-pastoris* a member of \_\_\_\_\_ type.  
a) crucifer                                        b) asterad  
c) solenoid                                       d) chenopodiad
- 7) The polar nuclei and male gamete fuse to form \_\_\_\_\_.  
a) secondary nucleus                        b) zygote  
c) primary endosperm nucleus            d) all of these
- 8) Function of tapetum is \_\_\_\_\_.  
a) protective                                    b) nutritive  
c) respiratory                                   d) all of these

**Q.2 Answer Any Four of the following:** **08**

- Define flower as a modified shoot.
- Define cross pollination.
- What is endosperm?
- What is double fertilization?
- Why fruits and seeds are dispersed?

- Q.3 Write short notes on any Two of the following. 08**
- a) Mechanism in entomophily (*calotropis*)
  - b) Nuclear endosperm
  - c) Explosive seed dispersal mechanism
- Q.4 Answer any Two of the following. 08**
- a) Describe the types of ovule.
  - b) Describe the development of monosporic embryo sac.
  - c) Explain in brief the wind dispersal of fruits and seeds.
- Q.5 Answer any One of the following. 08**
- a) Give an account of microsporogenesis and write the entire development of male gametophyte.
  - b) Describe the stepwise development of embryo in dicotyledons.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**GEOGRAPHY (Paper - VII)**  
**Economic Geography**

Day & Date: Thursday, 02-03-2023  
 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 diagram wherever necessary.

**Q.1 Choose and write a correct from given alternatives. 08**

- 1) Economic Geography is a branch of \_\_\_\_\_ Geography.
  - a) Cultural
  - b) Social
  - c) Political
  - d) Human
- 2) Agriculture is \_\_\_\_\_ type of economic activity.
  - a) Primary
  - b) Secondary
  - c) Tertiary
  - d) Quaternary
- 3) Agriculture Land use model by Von Thunes has given in \_\_\_\_\_.
  - a) 1726
  - b) 1826
  - c) 1926
  - d) 1996
- 4) Legal practices are a \_\_\_\_\_ types of economic activities.
  - a) Primary
  - b) Secondary
  - c) Tertiary
  - d) quaternary
- 5) Industrial location theory has given by \_\_\_\_\_.
  - a) A. Wagner's
  - b) A. Webers
  - c) Von Thunes
  - d) Carl Ritter
- 6) Trade is \_\_\_\_\_ types of occupation.
  - a) Primary
  - b) Secondary
  - c) Tertiary
  - d) Quaternary
- 7) The Special Economic Zone (SEZ) policy in India first came into inception on \_\_\_\_\_.
  - a) 1995
  - b) 2000
  - c) 2006
  - d) 2015
- 8) \_\_\_\_\_ is a primary types of economic activities.
  - a) Acting
  - b) Mining
  - c) Manufacturing
  - d) Transportation

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

- a) Define the concept of trade.
- b) What is SEZ?
- c) Define the economic activity.
- d) Give the definition of Economic Geography.
- e) What is commercial agriculture?
- f) Define the concept of manufacturing regions.



- Q.3 Write short notes on any two of the following. 08**
- a) Cotton Textile
  - b) Forestry
  - c) Tertiary Activities
- Q.4 Answer any two of the following. 08**
- a) Industrial location theory by Alfred Weber.
  - b) Explain the factors affecting on location of economic activity.
  - c) Explain the Iron and Steel industry in India.
- Q.5 Answer any one of the following. 08**
- a) Give the classification of economic activity.
  - b) Explain the agriculture landuse model by Von Thunes.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**ELECTRONICS (Paper - VII)**  
**Operational Amplifier and Applications**

Day & Date: Thursday, 02-03-2023  
 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.  
 4) Use of logarithmic table and calculator is allowed.

**Q.1 Choose correct answer.****08**

- 1) The differential amplifier can be used as \_\_\_\_\_.  
 a) voltage comparator                      b) voltage subtractor  
 c) voltage follower                          d) all of these
- 2) The slew rate of the IC 741 OpAmp is \_\_\_\_\_.  
 a) 0.5 V/ms                                      b) 0.5 V/ $\mu$ s  
 c) 5 V/ms                                         d) 5 V/ $\mu$ s
- 3) The \_\_\_\_\_ OpAmp configuration offers gain less than one.  
 a) inverting                                      b) differential  
 c) non-inverting                                d) both a and b
- 4) In case of zero crossing detector using OpAmp has \_\_\_\_\_ reference voltage.  
 a) +zero Volt                                    b) zero volt  
 c) -zero Volt                                    d) All of these
- 5) The voltage to current converter using OpAmp is \_\_\_\_\_ amplifier.  
 a) transresistance                            b) buffer  
 c) conductance                                d) transconductance
- 6) In case of non-inverting amplifier input voltage is 2 mV, input resistance is 10 K $\Omega$  and feedback resistance is 20 K $\Omega$ , then out voltage is \_\_\_\_\_.  
 a) 6 V                                              b) 6 mV  
 c) 2 mV                                            d) 2 V
- 7) 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
- 8) In case of basic differentiator circuit the capacitor is connected \_\_\_\_\_ path.  
 a) in feedback                                   b) at the inverting  
 c) at the non-inverting                        d) in designer chosen

**Q.2 Answer Any Four of the following:****08**

- a) Illustrate the four characteristics of ideal Operational Amplifier.
- b) Explain the need of differential amplifier.
- c) Define the OpAmp parameter Input bias current and input offset voltage.
- d) State any two non-linear application of OPamp.
- e) In case of OpAmp,  $A_d$  is 24000 and  $A_c$  is 0.12, find the CMRR in dB.
- f) Draw the neat labelled symbol of OpAmp and IC741 pin configuration.

- Q.3 Answer any Two of the following.** **08**
- a) Explain the need of closed configuration in OpAmp.
  - b) Explain the current mirror bias.
  - c) Explain the differentiator using OpAmp.
- Q.4 Answer any Two of the following.** **08**
- a) Explain the triangular wave generator using OpAmp.
  - b) Explain the slew rate of an OpAmp.
  - c) Explain the basic comparator using operational amplifier.
- Q.5 Answer any One of the following.** **08**
- a) State the various configurations of OpAmp. Derive the gain relation for the Inverting configuration.
  - b) Explain the following
    - 1) OpAmp as adder
    - 2) Wine bridge oscillator using OpAmp.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- Q.2 Answer any four of the following. 08**
- a) Give the name of Era representing recent life?
  - b) Give two names of periods of Mesozoic
  - c) What are inter-trapen beds?
  - d) Define Stratigraphy.
  - e) What is Epocs?
  - f) Define Index fossil.
- Q.3 Write short notes on any two of the following. 08**
- a) Classification of Cuddapah
  - b) Lithology and Age of Dharwar
  - c) Deccan Trap - Lithology and Distribution
- Q.4 Answer any two of the following. 08**
- a) Explain Indo-Gangetic Plains of India.
  - b) Classification of Delhi
  - c) Economic importance of Dharwar
- 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.

**Seat  
No.**

Page 1 of 2

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

- a) Write in detail about primary and secondary immune response.
- b) Describe collection, handling and transportation of samples for microbiological testing.
- c) Describe mode of transmission and pathogenesis of *Salmonella typhi*.

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

- a) Explain Complement fixation test.
- b) Draw and describe the structure of secondary lymphoid organs.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|



- Q.3 Write short notes on any two of the following. 08**
- a) Acid rain
  - b) Environmental program
  - c) Climate change
- Q.4 Answer any Two of the following. 08**
- a) Explain the Importance of Environmental Geography.
  - b) Explain the causes of desertification.
  - c) Explain in details of water pollution.
- Q.5 Answer any One of the following. 08**
- a) Explain the Nature of Environmental Geography.
  - b) Explain major ecosystem of the world.

**Seat  
No.**

Day & Date: Friday, 03-03-2023  
Time: 12:00 PM To 02:00 PM

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

08

- 1) The memory chip has 16-bit address bus then its capacity is \_\_\_\_\_.  
a) 32 KB                                      b) 64 KB  
c) 16 KB                                        d) 8 KB
- 2) The resolution of DAC is depending on \_\_\_\_\_.  
a) supply voltage                              b) digital inputs  
c) reference voltage                          d) analog output
- 3) In 8085 processor interrupts \_\_\_\_\_ has highest priority.  
a) RST 5.5                                      b) RST 7.5  
c) RST 6.5                                        d) TRAP
- 4) In linear address decoding \_\_\_\_\_ unused address lines are used for decoding purpose.  
a) only one                                      b) All  
c) none of these                                d) Three
- 5) \_\_\_\_\_ memories are made by using MOSFET and capacitors.  
a) SRAM                                          b) DRAM  
c) EPROM                                         d) PROM
- 6) In 8085 processor the stack pointer is \_\_\_\_\_ bit wide.  
a) 4                                                  b) 12  
c) 8                                                  d) 16
- 7) LDA 2040 H is a \_\_\_\_\_ byte instruction.  
a) one                                              b) two  
c) three                                            d) four
- 8) \_\_\_\_\_ is a bidirectional bus driver IC.  
a) 74244                                          b) 74245  
c) 74138                                          d) 74373

08

- Give the classification of semiconductor memory.
- Define Accuracy and Resolution of DAC.
- Write the role of ALE signal.
- Enlist conditional program control transfer group of instructions.
- Calculate analog voltage for 4-bit R-2R DAC if having digital inputs 1110 if 1 = 5 volt and 0 = 0 volt.
- State the role of program counter of 8085 processor.

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

- a) Explain generation of control signal  $\overline{\text{MEMR}}$ ,  $\overline{\text{MEME}}$ ,  $\overline{\text{IOR}}$  and  $\overline{\text{IOW}}$  with the help of decoder IC 74138.
- b) Draw the flag structure of 8085 and explain in brief the roll of each flag.
- c) Explain in brief the working of SAR type ADC.

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

- a) With suitable diagram explain in brief the working of the R-2R ladder network DAC.
- b) Define the terms.
  - 1) T State
  - 2) Machine cycle
  - 3) Fetch cycle
  - 4) Instruction cycle
- c) State the functions of following pins
  - 1)  $\text{IO}/\overline{\text{M}}$
  - 2)  $\overline{\text{WR}}$
  - 3)  $\overline{\text{RD}}$
  - 4)  $\text{SID}$

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

- a) Draw the internal block diagram of 8085 processor and explain ALU, Accumulator, and General-Purpose Register array of 8085 processor.
- b) What is instruction? Classify instruction set according to the function of an instructions with suitable example of each functional group.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Paper – VIII)**  
**Palaeontology**

Day &amp; Date: Friday, 03-03-2023

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 and labeled diagram wherever necessary.

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

- 1) \_\_\_\_\_ species is extinct.
 

|              |               |
|--------------|---------------|
| a) Productus | b) Turritella |
| c) Cardita   | d) Trilobites |
- 2) Mostly Fossils preserved in \_\_\_\_\_ rock.
 

|                 |               |
|-----------------|---------------|
| a) Argillaceous | b) Arenaceous |
| c) Rudaceous    | d) Volcanic   |
- 3) The mode of preservation of fossil is \_\_\_\_\_.
 

|                  |                 |
|------------------|-----------------|
| a) Mould         | b) Caste        |
| c) Carbonization | d) all of these |
- 4) Cardium belongs to \_\_\_\_\_.
 

|                    |                |
|--------------------|----------------|
| a) Gastropoda      | b) Cephalopoda |
| c) Lamellibranchia | d) Arthropoda  |
- 5) Most Mollusca are of \_\_\_\_\_ Habitats.
 

|               |                 |
|---------------|-----------------|
| a) Marine     | b) Terrestrial  |
| c) Freshwater | d) All of these |
- 6) Goniatite belongs to phylum \_\_\_\_\_.
 

|               |                |
|---------------|----------------|
| a) Coelentera | b) Arthropoda  |
| c) Mollusca   | d) Brachiopoda |
- 7) Fossil Paradoxide belongs to \_\_\_\_\_.
 

|               |                 |
|---------------|-----------------|
| a) Arthropods | b) Mollusca     |
| c) Gastropods | d) all of these |
- 8) Hemiaster belongs to \_\_\_\_\_.
 

|                  |               |
|------------------|---------------|
| a) Echinodermata | b) Brachiopod |
| c) Cephalopod    | d) Gastropoda |

**Q.2 Answer Any Four of the following:****08**

- a) Define fossil.
- b) Preservation of fossil in cold climate.
- c) Difference between caste and mold.
- d) Geological period of Cephalopoda.
- e) Any two uses of fossils.
- f) Significance of Gondwana flora.

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

- a) Morphology of Turritella
- b) Morphology of Terebratula
- c) Morphology of Pectene

**Q.4 Answer any Two of the following.**

**08**

- a) Write evolutionary history of horse.
- b) Write conditions of fossilization.
- c) Morphology of Trinucleus.

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

**08**

- a) Classification and morphology of Echinus and Micraster.
- b) Classification and morphology of Spirifer and Productus.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Paper-VIII)**  
**Industrial Microbiology**

Day & Date: Friday, 03-03-2023  
Time: 03:00 PM To 05:00 PM

Max. Marks: 40

- Instructions:** 1) All the 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 wt. H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

### Q.1 Multiple choice questions

08

- 1) For aeration fermentor is supplied with a device called \_\_\_\_\_.
  - a) Impeller
  - b) Baffles
  - c) Sparger
  - d) coiling coils
- 2) Example of dual fermentation production is \_\_\_\_\_.
  - a) L- lysine
  - b) Penicillin
  - c) Streptomycin
  - d) None of above
- 3) Which of the following nitrogen source is used in penicillin fermentation?
  - a) Molasses
  - b) CSL
  - c) SWL
  - d) Whey
- 4) Which of the following is Ideal Characteristics of Strain \_\_\_\_\_?
  - a) Rapid growth
  - b) Genetic stability
  - c) Non-toxicity to humans
  - d) All of these
- 5) During the preservation of microbial cell culture \_\_\_\_\_.
  - a) metabolism stops
  - b) metabolism changes
  - c) physiology changes
  - d) metabolism continues
- 6) Capacity of Pilot plant tanks is \_\_\_\_\_ or slightly larger.
  - a) 25 to 100 gallons
  - b) 10 to 20 lit
  - c) 1,000 to 20,000 lit
  - d) 50 to 100 lit
- 7) During active penicillin production the pH is maintained \_\_\_\_\_.
  - a) 8 to 9
  - b) 6.4 to 6.8
  - c) 4.4 to 4.8
  - d) 3.5 to 4.5
- 8) Which of the following process is used in the recovery of the product?
  - a) Downstream processing
  - b) Upstream processing
  - c) Chromatography
  - d) Treatment process

- Q.2 Answer any four of the following. 08**
- a) What is a batch fermentation?
  - b) Impeller
  - c) Define Inoculum
  - d) Define screening
  - e) What is distillation?
  - f) Define Strain
- Q.3 Write short notes on any Two of the following. 08**
- a) Difference between surface and submerged fermentation.
  - b) Explain primary screening with 2 examples.
  - c) Precipitation as a recovery process.
- Q.4 Answer any Two of the following 08**
- a) Explain scale up of fermentation.
  - b) Strain improvement by mutation
  - c) Explain dual and multiple fermentation.
- Q.5 Answer any One of the following. 08**
- a) Explain in detail preservation of industrially important microorganisms.
  - b) Write an account on SCP

|             |  |
|-------------|--|
| Seat<br>No. |  |
|-------------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**ENGLISH (Compulsory)**  
**Literary Mindscapes - I**

Day & Date: Friday, 27-01-2023  
 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 from the given option.**

**08**

- 1) What was Della's fear with her new haircut?
  - a) Jim wouldn't love her anymore
  - b) made her look like a nun
  - c) made her look ugly
  - d) She would look less fashionable
- 2) What was Phatik's deepest desire in the story 'The Home Coming'?
  - a) to belong and be loved
  - b) to be a ring leader
  - c) to be a boats man
  - d) to become a teacher
- 3) What makes the maidens song extraordinary?
  - a) it's musicality
  - b) it's eternal nature
  - c) it's theme
  - d) her voice
- 4) What does Queen Gulnar desire in the poem?
  - a) the Kings alteration
  - b) more jewellery
  - c) a rival
  - d) more clothes
- 5) What did the school master love above all?
  - a) discipline
  - b) learning
  - c) debate
  - d) sports
- 6) The hunter killed the tiger. (change into passive voice)
  - a) The tiger was killed by the hunter
  - b) The tiger was killed by someone
  - c) The hunter killed some tigers
  - d) The tiger killed the hunter
- 7) Her grandfather \_\_\_\_\_ after a long illness.
  - a) passed out
  - b) passed away
  - c) passes by
  - d) passed by
- 8) She \_\_\_\_\_ among all her classmates because of her intelligence and smartness.
  - a) stands away
  - b) stand above
  - c) stands out
  - d) stand by



- Q.2 Answer any four of the following Questions. 12**
- a) What did the couple in the story 'The Gift of Magi' decide to gift each other?
  - b) Why did Phatik feel suffocated in the big city?
  - c) What trouble did the poet have with the song in the poem 'The solitary reaper'?
  - d) Why is the Queen unsatisfied in the poem 'The Queens Rival'?
  - e) What is the significance of the two roads in the poem 'The Road Not Taken'?
  - f) Describe the character of the village school master.
- Q.3 Answer the following question. (Any one) 10**
- a) You are the student Secretary of Cultural department, a differences arouse among the students of Group dance ones a minor issue of dance steps. What step will you initiate to resolve the issue and ensure that harmony prevails.
  - b) What are the 21<sup>st</sup> Century Skills? Explain them in details.
- Q.4 As a native of Solapur, how will you solve the problem of deforestation (cutting down the trees) due to the construction of the National and State Highways. 10**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Special Paper- IX)**  
**Mathematical Physics & Statistical Physics**

Max. Marks: 80

**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.

## 10

- Page 1 of 2

- 10) Energy of highest filled quantum state is \_\_\_\_\_.  
a) Free energy                      b) Fermi energy  
c) Zero point energy              d) Electron energy

**B) Fill in the blank/Definition/One sentence answer/ one word answer/ 06**  
Give the name/'Predict the product etc.

- 1) Define priori probability.
- 2) Stokes theorem gives the relation between line integral with \_\_\_\_\_.
- 3) Write Laplacian operator  $\nabla^2$  in orthogonal curvilinear co-ordinates.
- 4) What do you mean by an ensemble?
- 5) Rest mass of photon is \_\_\_\_\_.
- 6) What are accessible microstates?

**Q.2 Solve any eight of the following.** **16**

- Define Boson and Fermions.
- Define orthogonal curvilinear coordinate.
- Define canonical and micro canonical ensemble.
- Define R.M.S Velocity.
- Write basic postulates of Bose-Einstein statistics.
- Define microstates and macrostates.
- What is phase space?
- Define most probable distribution.
- What is Cartesian co-ordinates system?
- What is Fermi energy?

**Q.3 A) Attempt any two of the following. 10**

- 1) State and prove Stoke's theorem.
- 2) Obtain an expression for divergence of vector field in orthogonal curvilinear coordinates System.
- 3) Explain electronic specific heat of metals.

**B) Write Short note/Solve. 06**

Obtain an expression for average speed of gas molecules.

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

- 1) Derive Rayleigh-Jean's formula from Planck's radiation formula.
- 2) Explain Green's first theorem.
- 3) Deduce Wien's displacement law from Planck's radiation formula.

|                                  |           |
|----------------------------------|-----------|
| <b>B) Describe/Explain/Solve</b> | <b>08</b> |
|----------------------------------|-----------|

Derive Maxwell-Boltzmann distribution law.

**Q.5 Attempt any two of the following. 16**

- Derive Planck's radiation formula in terms of wavelength of black body radiation.
- Obtain an expression for curl of a vector field in orthogonal curvilinear coordinates.
- Derive Fermi-Dirac distribution law.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Special Paper - IX)**  
**Physical Chemistry**

Day & Date: Saturday, 28-01-2023  
 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 and labeled diagram and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

**Q.1 A) Choose the correct alternative and write the sentences. 10**

- The equation,  $F = C - P + 2$ , represent \_\_\_\_\_.  
 a) phase equation                      b) Gibb's phase rule  
 c) reduced phase rule                d) all of these
- The emf of Daniell cell is 1 volt at 25°C. Hence  $\Delta G$  for its cell reaction is \_\_\_\_\_.  
 a)  $2 \times 96500 \text{ J}$                       b)  $- 2 \times 96500 \text{ J}$   
 c)  $1 \times 96500 \text{ J}$                       d)  $- 1 \times 96500 \text{ J}$
- The cell that converts electrical energy in to chemical energy is known as \_\_\_\_\_.  
 a) electrolytic cell                      b) voltaic cell  
 c) galvanic cell                        d) all of these
- In concentration cell, emf is produced due to decrease in \_\_\_\_\_ accompanying the cell reaction.  
 a) enthalpy                              b) entropy  
 c) free energy                        d) both (a) and (c)
- Electrode concentration cell can be prepared by using \_\_\_\_\_.  
 a) amalgam electrode                b) metal-metal ion electrode  
 c) calomel electrode                d) both a and c
- A packet of energy that available in a specific discrete amount is known as \_\_\_\_\_.  
 a) internal energy                      b) quantum  
 c) external energy                      d) both a and c
- For a system ice = water the degree of freedom is \_\_\_\_\_.  
 a) zero                                      b) one  
 c) three                                      d) two
- A positive value for the emf of the cell indicates the cell reaction is \_\_\_\_\_.  
 a) non-spontaneous                      b) reversible  
 c) spontaneous                        d) none of these
- For reaction that obeys Einstein law \_\_\_\_\_.  
 a)  $\phi = 1$                                   b)  $\phi = 0$   
 c)  $\phi < 1$                                   d)  $\phi > 1$

- 10) De Broglie equation is represented as \_\_\_\_\_.
- a)  $\lambda = \frac{h}{mv}$
- b)  $E = mc^2$
- c)  $\Delta E = E_2 - E_1$
- d) both (a) and (b)

**B) Fill in the blanks from the following.**

06

- 1) Homogeneous mixture of two or more chemical components is known as \_\_\_\_\_ solution.
- 2) Sodium amalgam electrode is represented as \_\_\_\_\_.
- 3) In concentration cells, emf is due to difference in \_\_\_\_\_.
- 4) An electrode at which oxidation occurs is called \_\_\_\_\_.
- 5) In photosynthesis \_\_\_\_\_ acts as a sensitizer.
- 6)  $\Delta X \cdot \Delta P \approx h$  is the mathematical expression of \_\_\_\_\_.

**Q.2 Solve any eight of the following.**

16

- What is Compton effect?
- Find the degree of freedom for the system, Four different gases enclosed in a cylinder.
- Represent the Daniell cell.
- Define oxidation and reduction.
- Define metal-metal ion electrode. Give its example.
- Give one application of EMF measurements.
- Define electrochemical series. What is the standard reduction potential of zinc electrode?
- State Lamberts and Beer's law.
- What is quantum yield?
- Define law of photochemical equivalence.

**Q.3 A) Attempt any two of the following.**

10

- 1) What are photochemical reactions? How do they differ from the dark reaction?
- 2) Write a note on reversible cell.
- 3) What is electrochemistry? What are electrolytic and voltaic cells?

**B) Solve the problem.**

06

Calculate the emf of the cell at 298K.



State whether the reaction is spontaneous? Give reason.

**Q.4 A) Attempt any two of the following.**

08

- 1) Explain black body radiation.
- 2) Explain Pattinson's process of desilverisation of lead.
- 3) A substance absorbs  $2 \times 10^{16}$  quanta of radiation per second and 0.002 moles of it react in 20 minutes. Calculate quantum yield of this reaction. ( $N = 6.023 \times 10^{23}$ )

**B)** Derive an expression for emf of an electrode concentration cell without transference.

08

**Q.5 Attempt any two of the following.**

16

- Write a brief note on Photoelectric effect.
- Discuss the application of phase rule to water system.
- Discuss in detail "Jablonski diagram".

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper – IX)**  
**Plant Systematics**

Day & Date: Saturday, 28-01-2023  
 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 and labeled diagram wherever necessary.

**Q.1 A) Multiple choice questions.****10**

- 1) *Annona squamosa* belongs to family \_\_\_\_\_.  
 a) Annonaceae                      b) Rutaceae  
 c) Malvaceae                      d) Poaceae
- 2) \_\_\_\_\_ is an example of Rutaceae family.  
 a) *Citrus sinensis*                      b) *Cocos nucifera*  
 c) *Mangifera indica*                      d) *Zea mays*
- 3) Bentham and Hooker's system of classification of angiosperm is \_\_\_\_\_.  
 a) Phylogenetic                      b) Natural  
 c) Artificial                      d) None of the above
- 4) \_\_\_\_\_ type of inflorescence is found in family Lamiaceae.  
 a) Spadix                      b) Hypanthodium  
 c) Verticillaster                      d) Spike
- 5) Gynobasic style is seen in \_\_\_\_\_ family.  
 a) Bignoniaceae                      b) Poaceae  
 c) Lamiaceae                      d) Rubiaceae
- 6) Sir J. C. Bose Botanical Garden is located at \_\_\_\_\_.  
 a) Delhi                      b) Kolhapur  
 c) Calcutta                      d) Pune
- 7) The elongation of internode between corolla and stamen is called \_\_\_\_\_.  
 a) Anthophore                      b) Androphore  
 c) Gynophore                      d) Carpophore
- 8) Monoadelphous stamens are found in \_\_\_\_\_ flower.  
 a) Cotton                      b) Rose  
 c) Mango                      d) Mustard
- 9) Example of tuberous root is \_\_\_\_\_.  
 a) Sweet potato                      b) Tomato  
 c) Carrot                      d) *Pothos*
- 10) *Allium cepa* (Onion) is \_\_\_\_\_ type of stem.  
 a) Tuber                      b) Corn  
 c) Rhizome                      d) Bulb

**B) Fill in the blanks from the following. 06**

- 1) The flower having calyx, corolla, androecium, and gynoecium is called as \_\_\_\_\_ flower.
- 2) The coloured sepal is called as \_\_\_\_\_ sepal.
- 3) In hypogynous flower the ovary is \_\_\_\_\_.
- 4) Male reproductive organ of flower is \_\_\_\_\_.
- 5) The entire inflorescence is enclosed by a large bract called \_\_\_\_\_.
- 6) Permanent calyx is called as \_\_\_\_\_ calyx.

**Q.2 Solve any eight of the following. 16**

- a) Give the special types of inflorescence with example.
- b) Sketch and label papilionaceous corolla and give example.
- c) Which are the types of aestivations?
- d) Define fruits.
- e) Give types of stamens with example.
- f) Explain the essential whorls of flower.
- g) What is parthenocarpic fruit?
- h) Mention the types of polypetalous forms of corolla.
- i) Give the functions of calyx.
- j) Give types of roots with example.

**Q.3 A) Attempt any two of the following. 10**

- 1) What is herbarium? Describe various steps involved in herbarium preparation.
- 2) Give definition of inflorescence and describe racemose types of inflorescence with suitable example.
- 3) Explain in brief about the Lead Botanical Garden Shivaji University, Kolhapur.

**B) Sketch label and describe the typical structure of flower. 06****Q.4 A) Attempt any two of the following. 08**

- 1) Describe the principals of ICBN.
- 2) What is Placentation? Describe its types.
- 3) Give economic importance of family Annonaceae.

**B) Describe the types of modifications in stem. 08****Q.5 Attempt any two of the following. 16**

- a) What is aggregate fruit? Describe its types with suitable example.
- b) Give the merits and demerits of Benthum and Hooker's system of classification.
- c) Give distinguishing characteristics of family Rutaceae with economic importance.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Special Paper – IX)**  
**Molecular Biology**

Day & Date: Saturday, 28-01-2023  
 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 diagrams and wherever necessary.  
 4) Use of calculator is allowed.

**Q.1 A) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) Following \_\_\_\_\_ element is not found in nitrogenous base.
  - a) Nitrogen
  - b) Carbon
  - c) Phosphorous
  - d) Hydrogen
- 2) The nature of DNA replication in eukaryotes is \_\_\_\_\_.
  - a) Conservative
  - b) Non conservative
  - c) Semi conservative
  - d) Cyanobacteria
- 3) The enzyme responsible for transcription is \_\_\_\_\_.
  - a) DNA polymerase
  - b) RNA polymerase
  - c) Reverse transcriptase
  - d) Ligase
- 4) Following \_\_\_\_\_ may be attached with adenine base in RNA.
  - a) Guanine
  - b) Cytosine
  - c) Uracil
  - d) Thymine
- 5) \_\_\_\_\_ is not a cloning vector.
  - a) Plasmids
  - b) Cosmids
  - c) BAC
  - d) Introns
- 6) Histone protein is present in \_\_\_\_\_.
  - a) Ribosome
  - b) Replisome
  - c) Nucleosome
  - d) Spliceosome
- 7) Hybridoma technology is used to synthesize \_\_\_\_\_.
  - a) Insuline
  - b) Growth hormone
  - c) Monoclonal antibodies
  - d) Interferons
- 8) Genetically engineered human insulin is called \_\_\_\_\_.
  - a) Humuline
  - b) Haematin
  - c) Aniline
  - d) Haematoxylene
- 9) Which of the following bond is not related to nucleic acid?
  - a) H-bond
  - b) Ester bond
  - c) Glycosidic bond
  - d) Peptide bond
- 10) Following \_\_\_\_\_ is required as inducer for the expression of Lac operon.
  - a) Glucose
  - b) Galactose
  - c) Lactose
  - d) Lactose and Galactose



- B) Write one sentence answer. 06**
- 1) Write location of DNA and RNA in a cell.
  - 2) Give name of nitrogenous bases.
  - 3) What is operon concept?
  - 4) Define hybridoma.
  - 5) Define transcription.
  - 6) What is SOS?
- Q.2 Solve any eight of the following. 16**
- a) Draw a figure of Helix model of DNA.
  - b) Types of RNA.
  - c) Functions of DNA.
  - d) What is DNA replication?
  - e) Define translation.
  - f) Significance of RNA.
  - g) What is Splicing?
  - h) Gene mapping.
  - i) Application of R-DNA in medicine.
  - j) Recombinant DNA technology.
- Q.3 A) Attempt any two of the following. 10**
- 1) Write an salient features of DNA.
  - 2) Write an salient features of RNA.
  - 3) Give an account on significance of polyacrilation.
- B) Write Short note. 06**
- Difference between prokaryotic and eukaryotic translation.
- Q.4 A) Attempt any two of the following. 08**
- 1) Describe properties of genetic code.
  - 2) Explain role of RNA polymerase.
  - 3) Describe mechanism of capping.
- B) Describe /Explain 08**
- miRNA and siRNA
- Q.5 Attempt any two of the following. 16**
- a) Describe mechanism of transcription in prokaryotes.
  - b) Give an account on principles of transcriptional regulation with example of lac operon.
  - c) Describe the mechanism of R-DNA.

**Seat  
No.**

## Max. Marks: 80

10

- Page 1 of 3



- B)** State and prove Cauchy schwarz inequality and also show that **08**  
 $\|x + y\| \leq \|x\| + \|y\|$

**Q.5 Attempt any Two of the following.** **16**

- a)** Let  $V$  and  $W$  be vector space and let  $T: V \rightarrow W$  be linear if  $V$  is finite dimensional then show that  $\text{nullity}(T) + \text{rank}(T) = \dim(V)$
- b)** Show that the set of members of  $a + b\sqrt{2}$  with  $a, b$  as rational number is a field
- c)** Let  $x = (2, 1 + i, i)$  and  $y = (2 - i, 2, 1 + 2i)$  be vector in  $\mathbb{C}^3$  compute  $\langle x, y \rangle$ ,  $\|x\|$ ,  $\|y\|$  and  $\|x + y\|$  Then verify Cauchy schwarz inequality and Triangle inequality.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper- IX)**  
**Statistical Inference – I**

Day & Date: Saturday, 28-01-2023  
 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 alternative** **10**

- 1) Consistency is property associated with \_\_\_\_\_  
 a) small samples                      b) large samples  
 c) any size samples                  d) None of these
- 2) If expected value of an estimator is equals to a parameter, it is said to be \_\_\_\_\_ estimator.  
 a) unbiased                              b) biased  
 c) consistent                              d) sufficient
- 3) Mean squared error of an estimator T of  $\theta$  is  
 a) Bias + Var(T)                      b)  $\{\text{Bias} + \text{Var}(T)\}^2$   
 c)  $\text{Bias}^2 + \text{Var}(T)^2$                   d)  $\text{Bias}^2 + \text{Var}(T)$
- 4) The estimator sample mean for population mean is  
 a) unbiased                              b) consistent  
 c) sufficient                              d) All of these
- 5) For a random sample of size n from Poisson distribution with parameter  $\theta$  ; MLE of  $\theta$  is  
 a) Median                                  b) Mode  
 c) Geometric Mean                      d) Mean
- 6) Let T be an unbiased estimator of  $\theta$ , then  $g(T)$  be surely unbiased for  
 a)  $g(\theta) = 3\theta + 1$                       b)  $g(\theta) = e^\theta$   
 c)  $g(\theta) = 2\theta^2 + 5\theta$                   d)  $g(\theta) = \theta^{\frac{1}{2}}$
- 7) Let  $X = 5$  be an observation from B(10, p). then maximum likelihood estimator of p is  
 a) 0.5                                          b) 1  
 c) 0                                              d) None of these
- 8) Pitman-Koopman form is used to obtain \_\_\_\_\_ statistics.  
 a) unbiased                              b) efficient  
 c) sufficient                              d) none of these
- 9) A sufficient statistics for  $\theta$  of U(0,  $\theta$ ) is  
 a) mean                                      b) median  
 c)  $\max(X_1, X_2, \dots, X_n)$               d)  $\min(X_1, X_2, \dots, X_n)$

- 10) For which of the following distribution moment estimators does not exist?
- |                |              |
|----------------|--------------|
| a) Laplace     | b) Lognormal |
| c) Exponential | d) Cauchy    |

**Q.1 B) Fill in the blank****06**

- 1) A statistics  $T$  is said to be sufficient for parameter  $\theta$ , if the conditional distribution of  $(X_1, X_2, \dots, X_n)$  given  $T = t$  is \_\_\_\_\_.
- 2) Likelihood function is function of \_\_\_\_\_ only.
- 3) Based on random sample of size  $n$  from  $U(0, \theta)$ , the moment estimator of  $\theta$  is \_\_\_\_\_.
- 4) Maximum likelihood estimator if exists, is function of \_\_\_\_\_ statistic.
- 5) The equality in Cramer- Rao inequality for lower bound of variance exists if \_\_\_\_\_.
- 6) If  $(X_1, X_2, \dots, X_n)$  be random sample of size  $n$  from  $f(x, \theta)$  then  $I_{X_1, X_2, \dots, X_n}(\theta) = \_\_\_\_\_\_ I_X(\theta)$

**Q.2 Solve any eight of the following.****16**

- a) Define an estimator and give example of an unbiased estimator.
- b) Define Mean Squared Error(MSE) of an estimator  $T$ . What is the relationship between MSE and  $\text{Var}(T)$ , when  $T$  is an unbiased estimator?
- c) Define sufficient statistics. Is  $\bar{X}$  is regarded as a sufficient statistics for  $\mu$ , based on random sample of size  $n$  from  $N(\mu, \sigma^2)$ ?
- d) What do you mean by consistent estimator? Is it unique, if exists?
- e) State Neyman-Factorization theorem.
- f) Define minimum variance unbiased estimator (MVUE).
- g) Give an example which supports the statement 'MLE need not be unique'.
- h) Define Fisher information function.
- i) Explain the key difference between statistic and an estimator.
- j) Define unbiased estimator. Is  $X_1$  unbiased for  $\mu$ , based on random sample of size  $n$  from  $N(\mu, \sigma^2)$ ?

**Q.3 A) Attempt any two of the following.****10**

- 1) Find moment estimator of  $\theta$  if  $f(x) = \begin{cases} (1-\theta)\theta^x & ; x = 0,1,2,3, \dots \\ 0 & ; \text{otherwise} \end{cases}$
- 2) Write a note on method of minimum chi-square for estimating unknown parameters of distribution.
- 3) Obtain maximum likelihood and moment estimators of  $\theta$ , based on a random sample of size  $n$  from exponential distribution with parameter  $\theta$ .

- B)** Show that, sample mean is sufficient estimator of  $\lambda$  of a Poisson distribution

**06****Q.4 A) Attempt any two of the following.****08**

- 1) Prove that, if  $T$  is unbiased estimator of  $\theta$ , then  $\phi(T)$  is an unbiased estimator of  $\phi(\theta)$ , provided that  $\phi(\cdot)$  is linear function.
- 2) Let  $X_1, X_2$  be a random sample of size 2 from  $N(\mu, \sigma^2)$  distribution. Consider two estimators  $T_1 = \frac{X_1 + X_2}{2}$  and  $T_2 = \frac{2X_1 + 4X_2}{6}$ . Are  $T_1$  and  $T_2$  unbiased estimators of population mean? Find the efficiency of  $T_2$  with respect to  $T_1$ .
- 3) State and prove sufficient condition for consistency of an estimator.

- B)** Prove that a biased estimator is consistent if its bias and variance both tend to zero as the sample size tends to infinity. **08**

**Q.5 Attempt any two of the following.**

**16**

- a)** State and Prove Cramer-Rao inequality.  
**b)** Let  $X_1, X_2, \dots, X_n$  be a random sample of size  $n$  from  $G(\alpha, \lambda)$  distribution with pdf

$$f(x; \alpha, \lambda) = \begin{cases} \frac{\alpha^\lambda}{\Gamma(\lambda)} e^{-\alpha x} x^{\lambda-1}; & x \geq 0, \alpha > 0, \lambda > 0 \\ 0 & \text{otherwise} \end{cases}$$

Obtain sufficient statistic

- i) for  $\alpha$  when  $\lambda$  is known  
 ii) for  $\lambda$  when  $\alpha$  is known  
 iii) When both  $\alpha$  &  $\lambda$  are unknown
- c)** Let  $X_1, X_2, \dots, X_n$  be a random sample of size  $n$  from Exponential distribution with pdf

$$f(x; \theta) = \begin{cases} \theta e^{-\theta x} & x \geq 0, \theta > 0 \\ 0 & \text{otherwise} \end{cases}$$

Obtain

- i) MLE of  $\theta$ , and show that it is function of sufficient statistic.  
 ii) Fisher information function in MLE estimator.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Special Paper – IX)**  
**Economic Geology**

Day & Date: Saturday, 28-01-2023  
 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) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) Metasomatic replacement deposits are characterised by
  - a) Preservation of rock structure
  - b) Presence of pseudo morphs of replacing minerals after the replaced one
  - c) Absence of Crusification
  - d) All the above
- 2) Which is the most common ore of lead?
  - a) Sphalerite
  - b) Galena
  - c) Chromite
  - d) Bauxite
- 3) The process of oxidation and supergene enrichment takes place \_\_\_\_\_.
  - a) On surface
  - b) At shallow depth
  - c) At greater depth
  - d) In atmosphere
- 4) Hydrothermal replacement deposits are mainly produced in \_\_\_\_\_ rocks.
  - a) basalt
  - b) carbonate
  - c) granite
  - d) none of these
- 5) Which of the following rock types would most likely be the best oil reservoir?
  - a) Granite
  - b) Shale
  - c) Sandstone
  - d) Salt
- 6) Which of the following has control on formation of laterite?
  - a) Climate
  - b) Parent rock
  - c) Lithology
  - d) All of the above
- 7) Greenstone belts of Precambrian terrain are good for searching
  - a) Cu
  - b) Au
  - c) Fe
  - d) Sn
- 8) Diamond is an example of \_\_\_\_\_ magmatic deposits.
  - a) disseminated
  - b) segregated
  - c) injected
  - d) none of these
- 9) Mechanical concentration can occur only if the valuable minerals have:
  - a) high specific gravity
  - b) chemical resistance to weathering
  - c) durability (toughness and hardness)
  - d) All of the above



- 10) Fossil fuels are derived from which of the following sources?
- Organic matter trapped in sedimentary rock
  - Inorganic matter trapped in metamorphic rock
  - Organic matter trapped in igneous rock
  - Organic matter on the crust surface

**B) Answer the following. 06**

- Where is the Singhbhum copper belt located in India?
- What is the name for the surficial indicator of the hidden ore deposit?
- What is contact metasomatism?
- "The hydrothermal deposits are epigenetic ore deposit", True / False
- Chromite is mostly of which origin?
- What are sublimation deposits?

**Q.2 Answer the following questions. (Any Eight) 16**

- Name the mineral constituents of coal.
- What is reservoir rock?
- Give two examples of magmatic segregation ore deposits.
- Name any two processes of ore formation of syngenetic deposits.
- Name the types of cavity filling hydrothermal ore deposits.
- Write the condition of formation of residual deposits.
- Name the ore minerals of Manganese.
- Define the term ore deposit.
- Write sequentially the zones of formation of supergene enrichment deposits.
- Define the term Tenor of ores.

**Q.3 A) Answer the following questions. (Any Two) 10**

- Explain the process of formation of Residual deposits with suitable example.
- Discuss the classification of coals with its chemical constituents.
- Describe the occurrences and distribution of Iron ore deposits.

**B) Write short note on Contact metasomatic ore deposits. 06**

**Q.4 A) Answer the following questions. (Any Two) 08**

- Discuss the geological occurrence and distribution of gold deposits in India.
- Define Gossan. Write a brief note on Supergene Sulphide enrichment with neat labelled diagram.
- Write note on Sublimation with suitable example.

**B) Explain in brief the Magmatic ore deposits and its types with suitable Indian examples. 08**

**Q.5 Answer the following questions. (Any Two) 16**

- Explain the process of formation of Natural gas and its reservoir rocks.
- Discuss in detail the conditions for formation of hydrothermal deposits with suitable examples.
- Describe the origin, occurrence and distribution of coal.

|  |  |
|--|--|
|  |  |
|--|--|

## Max. Marks: 80

Page 1 of 2

- 10) An icosahedral capsid consists of \_\_\_\_\_ capsomers.
- |               |                 |
|---------------|-----------------|
| a) Hexagonal  | b) Pentagonal   |
| c) Triangular | d) Both a and b |

**B) Define the following.****06**

- 1) Capsid
- 2) Viroids
- 3) Prions
- 4) Burst period
- 5) Defective immunity
- 6) Lytic phage

**Q.2 Solve any eight of the following.****16**

- a) What is envelope?
- b) What is the hypothesis of cancer?
- c) What is prophage?
- d) What is role of CI, CII and CIII protein?
- e) What is oncogenesis?
- f) What is somatic mutation?
- g) Symptoms of plant viral diseases.
- h) Enlist DNA oncogenic viruses.
- i) What is complex symmetry?
- j) One step growth experiment.

**Q.3 A) Attempt any two of the following.****10**

- 1) Give a detailed account on properties of cancer cell.
- 2) Describe in detail replication of adenovirus.
- 3) Describe in brief prevention and control of plant viral disease.

**B) Discuss in detail the concept of Lysogeny of  $\lambda$  phage.****06****Q.4 A) Attempt any two of the following.****08**

- 1) Give a detailed account on TMV virus.
- 2) Give a brief account on structure and properties of virus.
- 3) Discuss in brief structure and replication of influenza virus.

**B) What is cancer? Discuss in detail types of cancer.****08****Q.5 Attempt any two of the following.****16**

- a) Describe in detail viral classification on the basis of LHT system.
- b) Describe in detail lytic cycle of T<sub>4</sub> bacteriophage.
- c) Give a detailed account on isolation, cultivation and enumeration of viruses.

**Seat  
No.**

**P**

Day & Date: Saturday, 28-01-2023  
Time: 03:00 PM To 06:00 PM

**Instructions:**

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

10

- 1) If the control voltage of a VCO decreases, then its output frequency is \_\_\_\_\_.  
a) decreases                      b) increases  
c) remain same                  d) none of these
- 2) \_\_\_\_\_ process is used for growing a single crystal silicon structure upon an original silicon substrate.  
a) Oxidation                      b) Lithography  
c) Epitaxial                      d) Ion Implantation
- 3) An antilog amplifier has a \_\_\_\_\_ in series with the input.  
a) inductor                      b) a resistor  
c) a capacitor                    d) diode or BJT
- 4) In the low pass filter at exact high cut off frequency the roll of rate is \_\_\_\_\_.  
a) 20 dB                          b) 3 dB  
c) 40 dB                          d) 60 dB
- 5) In IC regulators \_\_\_\_\_ is used for providing the more current to the load.  
a) series pass transistor        b) reference amplifier  
c) error amplifier                d) protection circuits
- 6) The PLL in normal condition operates \_\_\_\_\_.  
a) in a capture mode              b) in a lock range mode  
c) in a filter mode                d) in a free running mode
- 7) In basic circuit of \_\_\_\_\_ the thermal shutdown and current limiting is included.  
a) IC LM 317                      b) IC  $\mu\text{A}$  741  
c) IC NE 555                      d) IC LF 398
- 8) The second low pass filter the number of RC combinations are \_\_\_\_\_.  
a) four                              b) three  
c) two                                d) one
- 9) In an active clipper circuit, the clipping level is decided by the \_\_\_\_\_.  
a) input voltage                  b) supply voltage  
c) output voltage                d) reference voltage

- 10) In the IC \_\_\_\_\_ is made by using transistor structure.
- |              |          |
|--------------|----------|
| a) capacitor | b) diode |
| c) resistor  | d) FET   |

**B) Define the following.****06**

- 1) Integrated Circuit
- 2) Log Amplifier
- 3) Roll of Rate
- 4) Load regulation
- 5) VCO
- 6) Phase Lock Loop

**Q.2 Solve any eight of the following.****16**

- a) State advantages of Integrated circuits over discrete circuits.
- b) Draw the circuit diagram of active clamper circuit.
- c) State the advantages of active filters over passive filter.
- d) Draw the circuit diagram of voltage regulator using IC 7815.
- e) State the application of PLL.
- f) Calculate the value of IC resistance having sheet resistance of  $400 \Omega / \text{sq.}$  and has aspect ratio  $L:W=10:1$ .
- 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 log amplifier.
- i) Define cut off and center frequency of the filter.
- j) Define drop out voltage and ripple rejection of regulator.

**Q.3 A) Attempt any two of the following.****10**

- 1) With suitable diagram explain the working of precision full rectifier.
- 2) Explain the fabrication process of resistor in IC.
- 3) Explain Butterworth second order high pass filter.

**B) Explain working principal 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 PLL as a FM demodulator.
- 3) Explain working of active peak detector.

**B) What is voltage regulator? Draw the functional block diagram of IC voltage regulator and explain function of each block.****08****Q.5 Attempt any two of the following.****16**

- a) Explain working V to F converter by using IC LM 331.
- b) Give the classification of filter and explain narrow band pass filter.
- c) Explain with neat diagram fabrication of NPN transistor in IC.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Saturday, 28-01-2023  
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) By default Priority of thread is \_\_\_\_\_.  
a) Normal                                      b) Highest  
c) Above normal                                d) Below normal
- 2) CLR is the .NET equivalent of \_\_\_\_\_.  
a) Java Virtual Machine  
b) Common Language Runtime  
c) Common Language Specification  
d) Common Type system
- 3) Inheritance is \_\_\_\_\_ in nature.  
a) Associative                                  b) Transitive  
c) Commutative                                 d) Iterative
- 4) C# does not support \_\_\_\_\_.  
a) Abstraction                                  b) Polymorphism  
c) Multiple inheritance                        d) Inheritance
- 5) Two method with same name but different parametersis known as \_\_\_\_\_.  
a) Overloading                                 b) Multiplexing  
c) Duplexing                                    d) Loading
- 6) Every class directly or indirectly extends the \_\_\_\_\_ class.  
a) System                                        b) Object  
c) Drawing                                      d) Console
- 7) Abstract class contains \_\_\_\_\_.  
a) Abstract method                            b) Non abstract method  
c) Both a and b                                d) None of these
- 8) The default scope for the members of an interface is \_\_\_\_\_.  
a) Private                                        b) Public  
c) Protected                                    d) Internal
- 9) The Point at which an exception is thrown is called \_\_\_\_\_.  
a) Default point                                b) Invoking point  
c) Calling point                                 d) Throw Point
- 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) \_\_\_\_\_ are intended to be common libraries that any other application can use.
- 2) \_\_\_\_\_ parameter are used to pass result back to the calling method and it does not create new storage location.
- 3) Virtual method defined in \_\_\_\_\_ class is inherited by it's derived class.
- 4) \_\_\_\_\_ statement is to ensure that the necessary cleanup of Object in Exception handling.
- 5) An anonymous method is one way to create an \_\_\_\_\_ block of code.
- 6) The Binary Reader and Writer class allows you to read and write \_\_\_\_\_ data Types to an underlying stream in a compact binary format.

**Q.2 Answer the followings (Any Eight):****16**

- a) Define Garbage Collection.
- b) Define Read Only Field.
- c) What is function overriding?
- d) Define delegate.
- e) What is the namespace?
- f) What is Assembly?
- g) Define Event.
- h) Define CTS.
- i) Define Enumeration.
- j) Define Polymorphism.

**Q.3 A) Answer the followings (Any Two):****10**

- 1) What is abstract class and abstract method? Write a program for Abstract class and abstract method.
- 2) Explain Thread Life Cycle.
- 3) Write a program for file which can write data into file and read data from file.

**B) Write short note on common Language Runtime.****06****Q.4 A) Answer the followings (Any Two):****08**

- 1) What is sealed class? Write a program for sealed class.
- 2) Write a program for multicast delegate.
- 3) What is property? Write a program for property.

**B) Explain Exception Handling. Write a program for multiple catch block.****08****Q.5 Answer the following (Any Two).****16**

- a) How to implement interface? Explain derived interface with program.
- b) Explain List Box control. Design a form having 2 List Box control which Perform following operation.
  - 1) Add one element from List Box 1 to List Box 2.
  - 2) Add all element from List Box 1 to List Box 2.
- c) What is File Stream? Explain Stream Reader and Stream Writer with example.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Special Paper - X)**  
**Solid State Physics**

Day & Date: Monday, 30-01-2023  
 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 logarithmic table and calculator is allowed.  
 4) Neat diagrams must be drawn and give equations wherever necessary.

**Q.1 A) Select correct alternative from the following. 10**

- 1) Bravais lattice in three dimensions is classified in \_\_\_\_\_.  
 a) three groups                      b) five groups  
 c) seven groups                      d) fourteen groups
- 2) Reciprocal of reciprocal lattice is \_\_\_\_\_.  
 a) square lattice                      b) direct lattice  
 c) reciprocal lattice                      d) inverse lattice
- 3) The electrical conductivity of the metal is \_\_\_\_\_.  
 a) independent of electron density  
 b) independent of proton density  
 c) depend upon proton density  
 d) dependent on electron density
- 4) In intrinsic semiconductor the number of conduction electron in C.B. and number of holes V.B. is \_\_\_\_\_.  
 a) unequal                      b) exactly equal  
 c) large                      d) none of the a, b, c
- 5) Diamagnetic material has \_\_\_\_\_ magnetic susceptibility.  
 a) negative                      b) positive  
 c) infinity                      d) zero
- 6) The temperature above which a ferromagnetic material behaves like a paramagnetic material is called \_\_\_\_\_.  
 a) Curie point                      b) Neel point  
 c) transition point                      d) cooling point
- 7) Superconductor is also called as a \_\_\_\_\_.  
 a) bad conductor                      b) hole conductor  
 c) perfect conductor                      d) semiconductor
- 8) The normal conductor become superconductor when \_\_\_\_\_.  
 a) its resistance becomes zero  
 b) its conductivity becomes zero  
 c) it melts  
 d) its resistance become high
- 9) Magnitude of reciprocal lattice vector is equal to \_\_\_\_\_.  
 a)  $d_{hkl}$                       b)  $1/d_{hkl}$   
 c)  $1^*d_{hkl}$                       d)  $d_{hkl}^2$



- 10) In intrinsic semiconductor the position of fermi energy level is \_\_\_\_\_.  
a) In the conduction band  
b) in the valence band  
c) exactly at centre of forbidden energy gap  
d) above the forbidden energy gap

**B) Give the correct answer and rewrite the following. 06**

- 1) Who invented X-ray?
- 2) In simple cubic crystal structure total number of lattice points per unit cell is \_\_\_\_\_.
- 3) First superconductor was invented at \_\_\_\_\_ temperature.
- 4) What is the general relation of magnetic susceptibility?
- 5) The relation of Fermi energy ( $E_f$ ) = \_\_\_\_\_.
- 6) In which class of solid material conduction band is completely empty?

**Q.2 Answer any eight of the following. 16**

- a) What is mean by packing fraction in crystallography?
- b) Draw the neat diagram of BCC structure.
- c) What is Bragg's law of x-ray diffraction?
- d) Define reciprocal lattice.
- e) What is forbidden energy gap?
- f) Write any two properties of ferromagnetic materials.
- g) What are the types of ferrites?
- h) What is critical temperature in superconductor?
- i) What are the types of superconductor?
- j) Define free or valance electron of metal.

**Q.3 A) Answer any two of the following 10**

- 1) Explain Miller indices. How they are determined?
- 2) Show that every reciprocal lattice vector is normal to the lattice plane of the crystal lattice.
- 3) Define Fermi energy and derive its expression at absolute zero temperature.

**B) Write a short note on hysteresis. 06**

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

- 1) Explain FCC crystal structure.
- 2) Write note on Hall-effect.
- 3) Distinguish between insulator, metal and semiconductors.

**B) Discuss Sommerfeld's model of metal and hence derive an expression for energy of free electron in the metal. 08**

**Q.5 Answer any two of the following 16**

- a) What are the types of crystal structure? Explain hexagonal close packed structure.
- b) What is superconductor? Explain the effect of magnetic field on superconductor.
- c) Give the classification of magnetic materials. State their properties.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Special Paper – X)**  
**Inorganic Chemistry**

Day &amp; Date: Monday, 30-01-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- 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) 4s orbital is \_\_\_\_\_ orbital.
 

|             |             |
|-------------|-------------|
| a) $a_{1g}$ | b) $t_{1u}$ |
| c) $t_{2g}$ | d) $eg$     |
- 2) In any chemical reaction, the rate of the reaction can be increased by \_\_\_\_\_.
  - a) adding product molecules to the reaction mixture
  - b) changing the size of the container
  - c) increasing the concentrations of the reactants
  - d) decreasing the temperature
- 3) Uranium-238 is a \_\_\_\_\_.
 

|                         |                            |
|-------------------------|----------------------------|
| a) fertile nuclear fuel | b) transuranic element     |
| c) man-made element     | d) non-radioactive element |
- 4) Sodium pump transports \_\_\_\_\_ ion into the cell.
 

|              |           |
|--------------|-----------|
| a) $Mg^{2+}$ | b) $K^+$  |
| c) $Ca^{2+}$ | d) $Na^+$ |
- 5) Catalyst reduces the rate of chemical because \_\_\_\_\_.
  - a) lower activation energy
  - b) increase activation energy
  - c) neither lower activation energy nor increase activation energy
  - d) none of these
- 6) In plants, carboxylase involved \_\_\_\_\_ metal.
 

|       |       |
|-------|-------|
| a) K  | b) Zn |
| c) Ca | d) Fe |
- 7) Ferritin is \_\_\_\_\_.
 

|                   |                    |
|-------------------|--------------------|
| a) transport iron | b) store iron      |
| c) protein chain  | d) transport $O_2$ |

- 8)** In octahedral complexes each  $t_{2g}$  electrons is destabilized by \_\_\_\_\_.
- a)  $-6 Dq$                       b)  $-4 Dq$   
c)  $+6 Dq$                       d)  $+4 Dq$
- 9)**  $[Fe(CN)_6]^{3-}$  is \_\_\_\_\_ spin complex.
- a) high                          b) moderate  
c) low                          d) intermediate
- 10)** In structure determination of  $PCl_5$ , the isotope used is \_\_\_\_\_.
- a)  $^{36}N$                         b)  $^{36}P$   
c)  $^{36}C$                         d)  $^{36}Cl$

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ 06**  
**Give the name/Predict the product etc.**

- 1) The crystal field theory considers the metal-ligand bond to be a \_\_\_\_\_ bond.
- 2) Identify the correct relation between  $\Delta_o$  and  $\Delta_t$ , where  $\Delta_o$  denotes crystal field splitting in octahedral complexes and  $\Delta_t$  denotes crystal field splitting in tetrahedral complexes.
- 3) Name the moderator used in the nuclear reactor.
- 4) Which isotope of Uranium has the capacity to sustain the chain reaction?
- 5) What is the function of the hemoglobin?
- 6) What is mean by homogeneous catalysis?

**Q.2 Answer the followings (Any Eight):** **16**

- 1) Define the crystal field splitting.
- 2) What is exothermic nuclear reactions?
- 3) What is function of Calcium in our body?
- 4) What is auto-catalyst give one example?
- 5) Draw the shapes of d orbitals.
- 6) Draw the structure of porphyrin.
- 7) What is role of tetra ethyl lead in the internal combustion engine?
- 8) What is indirect fertilizers?
- 9) What is applications of crystal field splitting?
- 10) What is artificial transmutation?

**Q.3 A) Answer the followings (Any two):** **10**

- 1) Distinguish between CFT and MOT.
- 2) Write a note boiling water reactor.
- 3) Write a note of sodium pump.

**B) Short note/Solve** **06**

Explain formation of octahedral complex of crystal field splitting of d orbitals.

- Q.4 A) Answer the followings (Any two):** **08**
- 1) Difference between Hemoglobin and Myoglobin.
  - 2) What is characteristics of catalytic reaction?
  - 3) Define fertilizer and explain brief quality of the ideal fertilizer.
- B) Describe/Explain/Solve** **08**
- Explain the structure and working of myoglobin.
- Q.5 Answer the following (Any Two).** **16**
- a) Discuss the adsorption theory of the catalyst.
  - b) With the help of MO diagram, explain the formation and characteristics of  $[\text{Ni}(\text{NH}_3)_6]^{2+}$ .
  - c) Write a note on radio-isotopes as tracers.

Set | P

- 10)** Mendel's Law of independent assortment holds good for genes situated on the \_\_\_\_\_.  
 a) non-homologous chromosomes  
 b) homologous chromosomes  
 c) extra nuclear genetic element  
 d) same chromosome

**B) Answer the following questions in single sentence. 06**

- 1) Define back cross.
- 2) What is cytoplasmic inheritance?
- 3) Define linkage.
- 4) What are holandric genes?
- 5) What is pure line?
- 6) Define epistasis.

**Q.2 Solve any Eight of the following. 16**

- a) What are multiple alleles?
- b) Enlist any two characters selected by Mendel.
- c) Give any two examples of maternal inheritance.
- d) What is continuous variation?
- e) What is cytoplasmic male sterility?
- f) Give significance of crossing over.
- g) Enlist the methods of sex determination.
- h) What is recombination frequency?
- i) Give the significance of test cross.
- j) What is complete linkage?

**Q.3 a) Attempt any Two of the following. 10**

- 1) Explain the epistatic interaction with suitable example.
- 2) Explain the concept of crossing over.
- 3) Explain the inheritance of Haemophilia disease in man.

**b) Write a note on Hardy Weinberg Law. 06**

**Q.4 a) Attempt any Two of the following. 08**

- 1) Explain the complementary gene interaction with suitable example.
- 2) Explain the inheritance of Colour blindness.
- 3) Explain the concept of linkage map.

**b) Explain the bridges theory of sex determination. 08**

**Q.5 Attempt any Two of the following. 16**

- a) Explain the coupling and repulsion hypothesis with suitable diagram.
- b) Explain the Mendels law of segregation with suitable example.
- c) Explain the inheritance of genes in chloroplast.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Special Paper-X)**  
**Principles of Genetics**

Day & Date: Monday, 30-01-2023  
 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 question.**

**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
- 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
- 8) \_\_\_\_\_ Scientist done the study on linkage.
  - a) Bateson and Punnel
  - b) Sulton and Boverly
  - c) T.H. Morgon
  - d) None
- 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

- 10) Belling's copy choice theory is the theory of \_\_\_\_\_.  
a) Crossing over                      b) Mutation  
c) Synapsis                            d) None

**Q.1 B) Fill in the blanks/ definition / One sentence answer / One word answer / 06**  
**Give the name / Predict product etc.**

- 1) \_\_\_\_\_ basic unit of heredity.
- 2) \_\_\_\_\_ introduced the theory of inheritance.
- 3) \_\_\_\_\_ is the process by which the DNA is copied in cell.
- 4) \_\_\_\_\_ Cell makes RNA copies.
- 5) \_\_\_\_\_ is a set of rules defining code of DNA.
- 6) \_\_\_\_\_ Small single celled organism.

**Q.2 Solve any Eight of the following:** **16**

- a) Incomplete Dominance
- b) Crossing Over
- c) Linkage
- d) Transports in Bacteria
- e) Transformation
- f) Sex determination
- g) Mutation
- h) Down's Syndrome
- i) Klinefelter's Syndrome
- j) Turners Syndrome

**Q.3 a) Attempt any Two of the following: 10**

- 1) Describe laws of Mendelian Inheritance.
- 2) Mechanism of Crossing Over
- 3) Molecular basis of mutation in relation to UV.

|                              |           |
|------------------------------|-----------|
| <b>b) Short Note/ Solve.</b> | <b>06</b> |
| Transduction with example.   |           |

**Q.4 a) Attempt any Two of the following: 08**

- 1) Extra chromosomal inheritance with example
- 2) Chromosomal mechanisms of sex determination
- 3) Polygenic Inheritance

**b) Describe/ Explain /Solve.** **08**

- 1) Type of chromosomal abbreviation
- 2) Type of Gene Mutation
- 3) Cytological basis of Crossing Over

**Q.5 Attempt any Two of the following. 16**

- Describe in detail Gene Interactions.
- Write in detail supplementary gene with example.
- Explain in details Chromosomal Mapping.



**Seat  
No.**

## Max. Marks: 80

**10**

- $$\sum_{n=0}^{\infty} \frac{z^n}{n!}$$

- 7)  $\int_L |dz|$  where L is any rectifiable arc joining the points  $z=a$ ,  $z=b$  is equal to \_\_\_\_\_.  
a)  $b - a$   
b) arc length L  
c)  $|b - a|$   
d) 0
- 8) An analytic function with constant modulus is \_\_\_\_\_.  
a) may be variable or constant  
b) constant  
c) variable  
d) modulus
- 9) Any function of x and y possessing continuous partial derivatives of the first and second order is called a harmonic function if it satisfies.  
a) Laplace's equation  
b) Lagrange's equation  
c) Euler's equation  
d) Cauchy's equation
- 10) If  $f(z) = u + iv$  is analytic function in a finite region and  $u = x^3 - 3xy^2$ , then v is \_\_\_\_\_.  
a)  $3x^2y^2 - y^3 + c$   
b)  $3x^2y - y^2 + c$   
c)  $3x^2y + y^3 + c$   
d)  $3x^2y - y^3 + c$

**B) Fill in the blanks.**

06

- 1) If  $L$  is any rectifiable arc joining the points  $z=a$ ,  $z=b$  then  $\int_L z \, dz$  is equal to \_\_\_\_\_.
- 2) If  $c$  is straight line from  $(1,0)$  to  $(1,1)$  then the value of integral  $\int_L \bar{z} \, dz$  is \_\_\_\_\_.
- 3) If  $f(z) = u + iv$  be an analytic function of  $z = x + iy$  then the families of curves  $u=\text{constant}$ ,  $v=\text{constant}$  are \_\_\_\_\_ to each other.
- 4) Then function  $w = |z|^2$  is continuous everywhere but nowhere differentiable except at the \_\_\_\_\_.
- 5) If  $\lim_{z \rightarrow a} (z - a)f(z) = A$  and if  $c$  is the arc  $\theta_1 \leq \theta \leq \theta_2$  of the circle  $|z - a| = r$  then  $\lim_{r \rightarrow 0} \int_c f(z) dz =$  \_\_\_\_\_.
- 6) If  $f(z) = \frac{1}{(z-1)(z-2)(z-3)}$ , residue of  $f(z)$  at  $z = 1$  is \_\_\_\_\_.

**Q.2 Answer the following questions. (Any Eight)**

16

- What kind of singularity has the function  $f(z) = \frac{1}{\cos(1/z)}$  at  $z = 0$ .
- Show that when  $0 < |z| < 4$  then  $\frac{1}{4z - z^2} = \sum_{n=0}^{\infty} \frac{z^{n-1}}{4^{n+1}}$
- Expand  $\frac{1}{z(z^2 - 3z + 2)}$  for the region,  $1 < |z| < 2$
- Find residue of  $\operatorname{cosec} z$
- Find residue of  $\frac{z^3}{(z-1)^4(z-2)(z-3)}$  at  $z = 2, 3$
- Evaluate  $\int_c \frac{e^z}{z(z-1)^2} dz$  where  $c$  is circle  $|z| = 2$ .

- g) Evaluate  $\int_c \frac{z-3}{z^2+2z+5} dz$  where  $c$  is circle  $|z| = 1$ .
- h) If  $f(z)$  and  $g(z)$  are analytic function in a domain  $D$  then prove that  

$$\frac{d}{dz}(f(z) \cdot g(z)) = f(z) \frac{d}{dz}g(z) + g(z) \frac{d}{dz}f(z)$$
- i) If  $f(z) = e^z$ . show that Cauchy-Riemann equations are satisfied.
- j) Show that a harmonic function satisfies the formal differential equation  

$$\frac{\partial^2 u}{\partial z \partial \bar{z}} = 0$$

**Q.3 A) Answer the following questions. (Any Two)****10**

- 1) Show that  $\int_0^\pi \frac{d\theta}{(a + \cos\theta)^2} = \frac{\pi a}{(a^2 - 1)^{3/2}}, a > 1$
- 2) Evaluate  $\int_{(0,1)}^{(2,5)} (3x + y)dx + (2y - x)dy$  along the curve  
 a)  $y = x^2 + 1$   
 b) The straight line  $(0,1)$  to  $(0,5)$  and then from  $(0,5)$  to  $(2,5)$
- 3) If  $f(z) = u + iv$  is an analytic function of  $z = x + iy$  and  
 $u - v = \frac{e^y - \cos x + \sin x}{\cosh y - \cos x}$  find  $f(z)$ .

**B) Prove that the polar form of Cauchy's Riemann equations****06**

$$\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta} \text{ and } \frac{\partial u}{\partial \theta} = -r \frac{\partial v}{\partial r} \text{ where } r = \sqrt{x^2 + y^2}, \theta = \tan^{-1}(y/x)$$

**Q.4 A) Answer the following questions. (Any Two)****08**

- 1) If  $f(z) = \frac{x^3(1+i) - y^3(1-i)}{x^2 + y^2}, (x, y) \neq (0,0)$   
 $= 0 \quad (x, y) = (0,0)$   
 Prove that C.R. equation satisfy at the origin.
- 2) Prove that the function  $\sin\left(c\left(z + \frac{1}{z}\right)\right)$  can be expanded in the series of  
 type  $\sum_{n=0}^{\infty} a_n z^n + \sum_{n=1}^{\infty} b_n z^{-n}$  in which the coefficient  $z^n$  and  $z^{-n}$  are  

$$\frac{1}{2\pi} \int_0^{2\pi} \sin(2c \cos\theta) \cos n\theta d\theta$$
- 3) If  $c$  is an arc  $\theta_1 \leq \theta \leq \theta_2$  of the circle  $|z| = R$  and if  $\lim_{R \rightarrow \infty} z f(z) dz = A$   
 then prove that  $\lim_{R \rightarrow \infty} \int_c f(z) dz = i(\theta_2 - \theta_1)A$

**B) State and prove Cauchy's fundamental theorem.****08****Q.5 Answer the following questions. (Any Two)****16**

- a) State and prove Cauchy's Residue theorem.
- b) Prove that necessary and sufficient condition that  $w = f(z) = u + iv$  be regular in region  $R$  is that C.R. equations  $u_x = v_y$  and  $u_y = -v_x$  are sufficient in  $R$  where it is supposed that  $D$  is partial derivative continuous in  $R$ .

- c) Obtain the expression for  $\frac{(z-2)(z+2)}{(z+1)(z+4)}$  which are valid when
- 1)  $|z| < 1$
  - 2)  $1 < |z| < 4$
  - 3)  $0 < |z + 1| < 3$

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper- X)**  
**Probability Distributions**

Day & Date: Monday, 30-01-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

**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 A) Choose the correct alternatives from the options. 10**

- 1)** If  $X \sim B(1, p)$  r.v. suppose it is truncated at  $X = 0$  then  $E(X)$  is \_\_\_\_\_.
  - a)  $q/p$
  - b)  $q$
  - c)  $1$
  - d)  $0$
  
- 2)** If  $X$  follows truncated normal distribution truncated above 100 and below 0 then  $P(0 < X < 100)$  is = \_\_\_\_\_.
  - a)  $0$
  - b)  $1$
  - c) less than 1
  - d) none of these
  
- 3)** Let  $X$  be LN  $(0, 1)$  r.v. then  $\text{Var}(\log X + k) =$ 
  - a)  $e(e - 1)$
  - b)  $e(e + 1)$
  - c)  $e$
  - d)  $1$
  
- 4)** For  $X \sim \text{log normal } (\mu, \sigma^2)$  then median of  $X$  is
  - a)  $e^{\mu - \sigma^2}$
  - b)  $e^{\mu + \sigma^2}$
  - c)  $e^\mu$
  - d)  $e^{\mu - \frac{1}{2}\sigma^2}$
  
- 5)** For Cauchy distribution \_\_\_\_\_ moments of all orders do not exist.
  - a) raw
  - b) central
  - c) both a and b
  - d) a or b
  
- 6)** For Laplace distribution
  - a)  $\beta_1 = 0, \beta_1 = 6$
  - b)  $\beta_1 = 0, \beta_1 = 3$
  - c)  $\beta_1 > 0, \beta_1 > 6$
  - d)  $\beta_1 < 0, \beta_1 = 3$
  
- 7)** If  $(X, Y) \sim BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  then the conditional distribution of  $X$  given  $Y = y$  is \_\_\_\_\_ distribution.
  - a) normal
  - b) bivariate normal
  - c) lognormal
  - d) Cauchy

- 8) If  $X \sim C(2, 3)$ ,  $Y \sim C(3, 2)$  then  $X + Y$  is \_\_\_\_\_.  
 a)  $C(0, 1)$  b)  $C(5, 5)$   
 c)  $C(-1, 1)$  d)  $N(0, 1)$
- 9) If  $X$  follows Logistic  $(\mu, \sigma)$  then its c.d.f. is given by,  
 a)  $\frac{1}{1 + e^{-((x-\mu)/\sigma)}}$  b)  $\frac{1}{1 + e^{((x-\mu)/\sigma)}}$   
 c) Both a and b d) None of these
- 10) If  $X$  follows Pareto  $(\alpha, \beta)$  then mean is given by  
 a)  $\frac{\alpha\beta}{\alpha - 1}; \alpha > 1$  b)  $\frac{\alpha\beta}{1 - \alpha}; \alpha \neq 1$   
 c)  $\frac{\alpha\beta}{\alpha - 2}; \alpha > 2$  d)  $\frac{\alpha\beta}{2 - \alpha}; \alpha \neq 2$

**Q.1 B) Answer the following.**

06

- 1) Define Pareto distribution with parameters  $(\alpha, \beta)$
- 2) Write the p.m.f. of truncated binomial distribution, truncated at  $X = 0$ .
- 3) If  $X \sim \text{lognormal}(\mu, \sigma^2)$  write the expression for  $E(X)$ .
- 4) If  $(X, Y) \sim \text{BN}(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  write the pdf of  $(X - Y)$ .
- 5) State the additive property of Cauchy distribution.
- 6) Define Laplace distribution with parameters  $(\mu, \lambda)$ .

**Q.2 Answer the following. (Any Eight):**

16

- 1) If a binomial r.v. is truncated at  $X = 0$  then write down its p.m.f.
- 2) State relationship between Laplace distribution and exponential distribution.
- 3) For Laplace  $(\mu, \lambda)$  distribution state mean & variance.
- 4) If  $X$  is a standard Cauchy variate then state the distribution of  $X^2$
- 5) State the relationship between Cauchy and Uniform distribution.
- 6) If  $X$  is a non-negative r.v. such that  $Y = \log(X)$  is  $N(0, 1)$  then write the pdf of  $X$ .
- 7) Define power series distribution.
- 8) Let  $(X, Y)$  is  $BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  then state mean & variance of distribution of  $(X | Y = x)$ .
- 9) Write the joint p.d.f. of bivariate normal distribution.
- 10) Define Pareto distribution with parameters  $(\alpha, \beta)$

**Q.3 A) Answer the following. (Any Two):**

10

- 1) Obtain the m.g.f. of Laplace  $(\mu, \lambda)$  distribution.
- 2) If  $X \sim \text{lognormal}(0, 1)$  find mean and mode.
- 3) If  $X \sim P(\lambda)$ , truncated at  $X = 0$  find mean and variance.

- B)** If  $f(x,y) = K e^{-\frac{1}{2}(x^2+y^2)}$ ;  $-\infty < x, y < \infty$  find the value of K and  $E(X), V(X)$ . **06**
- Q.4 A) Answer the following. (Any Two):** **08**
- 1) Define logistic distribution with parameters  $(\mu, \sigma)$  and find its mean.
  - 2) Show that binomial distribution is a particular case of power series distribution.
  - 3) Find the distribution of ratio of two independent standard normal variates.
- B)** Find mean & variance of Weibull distribution with parameters  $(\alpha, \beta)$ . **08**
- Q.5 Answer the following (Any Two).** **16**
- a) Let X be a Logistic random variable with parameters  $(\mu, \sigma)$ , obtain C.D.F. and mean of X.
  - b) If X, Y are i.i.d exponential r.v.s. with parameter  $\theta$  then find the distribution of  $(X - Y)$
  - c) If  $(X, Y)$  is BN  $(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  then find the distribution of  $aX + bY + c$  where a,b and c are real numbers.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Monday, 30-01-2023  
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 diagrams wherever necessary.

**Q.1 A) Rewrite the sentence by filling the blanks with the correct answer from the given options. 10**

- 1) Infiltration in sedimentary terrain is \_\_\_\_\_ than igneous rock terrain.

  - a) lesser
  - b) greater
  - c) poor
  - d) very poor
- 2) Rate of infiltration is \_\_\_\_\_ in igneous rocks in tectonically disturbed area than its undisturbed equivalent & sandstone terrains.

  - a) better
  - b) poor
  - c) very poor
  - d) very good
- 3) Though it is a plain ground sedimentary terrain, the scope of infiltration decreases in \_\_\_\_\_ climatic regions like Siberia.

  - a) hot
  - b) tropical
  - c) cold
  - d) equatorial
- 4) Limestone is \_\_\_\_\_ aquifer for its primary porosity.

  - a) very good
  - b) good
  - c) bad
  - d) ideal
- 5) Topmost zone in vertical distribution of groundwater is \_\_\_\_\_ zone.

  - a) capillary
  - b) root
  - c) saturation
  - d) aeration
- 6) Shear zones in rocks are \_\_\_\_\_ porosity features.

  - a) secondary
  - b) effective
  - c) primary
  - d) bad
- 7) Aquifers in Basaltic terrain are mainly of \_\_\_\_\_ type.

  - a) unconfined
  - b) idealized
  - c) bad
  - d) confined
- 8) Localities Unhere & Tatapani is famous for \_\_\_\_\_.

  - a) hot springs
  - b) contact springs
  - c) depression springs
  - d) seepage areas
- 9) Plants adds water in water cycle by \_\_\_\_\_ & \_\_\_\_\_.

  - a) Evaporation, Transpiration
  - b) Transpiration, Sublimation
  - c) Transpiration, Guttation
  - d) Guttation, Evaporation



- 10) After precipitation, water flowing on ground surface is called as \_\_\_\_\_
- a) Flow
  - b) Flood
  - c) Surface runoff
  - d) River

**B) Answer the following** **06**

- 1) Define transpiration?
- 2) Define porosity.
- 3) Define piezometric surface.
- 4) Define surface runoff.
- 5) Define spring.
- 6) Define seepage.

**Q.2 Write answers to any eight of the following.** **16**

- a) What is magmatic water?
- b) What is connate water?
- c) What is juvenile water?
- d) What is Aquifer?
- e) What is Transmissivity?
- f) What is an artificial levee?
- g) What is a water table?
- h) What is aquifuge?
- i) What is aquitard?
- j) What is a basin?

**Q.3 A) Attempt any Two of the following.** **10**

- 1) Describe the porosity of sedimentary rocks & its deciding factors.
- 2) Explain the Utilization of Groundwater.
- 3) Describe types of groundwater basin.

**B) Describe Hydrological Cycle. Draw sketch.** **06**

**Q.4 A) Attempt any Two of the following.** **08**

- 1) Describe the depression spring.
- 2) Describe the contact spring.
- 3) Describe the factors controlling infiltration.

**B) Role of vegetation and rock type in groundwater recharge process.** **08**

**Q.5 Attempt any Two of the following.** **16**

- a) Explain how to identify textural features & the structural influence on an area using imagery wrt to groundwater.
- b) Describe the vertical distribution of groundwater.
- c) Explain the hot springs & its significance. Draw sketch of geyser.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Special Paper – X)**  
**Agricultural Microbiology**

Day & Date: Monday, 30-01-2023  
 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.

**Q.1 A) Rewrite the following sentences by selecting correct answer from the given alternative. 10**

- 1) Smallest particle in soil is called as \_\_\_\_\_.  
 a) sand                                      b) silt  
 c) clay                                        d) gravel
- 2) \_\_\_\_\_ is a polymer of glucose linked together by  $\beta$  1-4 linkage.  
 a) Starch                                      b) Lignin  
 c) Cellulose                                   d) Hemicellulose
- 3) \_\_\_\_\_ organisms are responsible for mobilization of  $PO_4$  in soil.  
 a) VAM fungi                                b) PSM  
 c) Desulfovibrio                            d) Nitrosomonas
- 4) \_\_\_\_\_ enzyme acts only on native cellulose molecule.  
 a)  $C_x$  cellulase                              b)  $\beta$  1-4 glucanase  
 c)  $C_1$  cellulase                              d) glycosidase
- 5) Biological reduction of molecular  $N_2$  to ammonia is called \_\_\_\_\_.  
 a) ammonification                        b) nitrification  
 c) denitrification                          d)  $N_2$  fixation
- 6) \_\_\_\_\_ of the following is capable of oxidizing sulfur to sulfates.  
 a) Thiobacillus thiooxidans            b) Rhodococcus  
 c) Desulfotomaculum                   d) Rhodospirillum
- 7) The uppermost soil horizon containing only organic matter is \_\_\_\_\_.  
 a) A                                              b) B  
 c) C                                              d) O
- 8) *Erwinia carotovora* is the causative agent of \_\_\_\_\_ disease.  
 a) Citrus canker  
 b) whip smut of sugar cane  
 c) Soft rot of potato  
 d) bacterial blight
- 9) \_\_\_\_\_ is the assimilable form of sulphur.  
 a) S                                              b)  $SO_4$   
 c)  $H_2S$                                         d)  $SO_2$
- 10) \_\_\_\_\_ is the most persistent pesticide found in nature.  
 a) Malathion                                b) DDT  
 c) Parathion                                d) 2, 4 -D

**B) Answer the following questions. 06**

- 1) Name the enzyme responsible for N<sub>2</sub> fixation.
- 2) \_\_\_\_\_ is the causative agent of oily spot of pomegranate.
- 3) Earthworms are used for production of \_\_\_\_\_ compost.
- 4) Give an example of detrimental association.
- 5) Name the product produced by ammonification.
- 6) Name the most dominant group of microorganisms in soil.

**Q.2 Solve any Eight of the following. 16**

- a) Define Phosphate solubilization.
- b) Give structure of hemicellulose.
- c) Define canker.
- d) Define Nitrate reduction.
- e) Define persistent pesticide.
- f) Define Ammensalism.
- g) Name two nitrogen fixing bacteria.
- h) Define biopesticides.
- i) Define Green manure.
- j) Define soil ecosystem.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Farm Yard Manure
- 2) Biological nitrogen fixation
- 3) Physical properties of soil

**B) Give an account of 'Carbon cycle'. 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) Explain Mutualism and commensalism.
- 3) Lignin degradation

**B) Give an account of Types of microorganisms in soil. 08****Q.5 Attempt any Two of the following. 16**

- a) Give structure of cellulose and give an account of biochemistry of cellulose degradation.
- b) Give an account of applications of biotechnology in agriculture.
- c) Explain production and significance of Vermicompost.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Monday, 30-01-2023  
Time: 03:00 PM To 6:00 PM

Max. Marks: 80

**Q.1 A) Select the correct alternative.**

10

- 1) The microcontroller 8051 has \_\_\_\_\_ of internal RAM.

|            |             |
|------------|-------------|
| a) 4 byte  | b) 128 byte |
| c) 4 Kbyte | d) 64 Kbyte |
- 2) The bit size of stack pointer in 8051 microcontroller is \_\_\_\_\_ Bit.

|       |       |
|-------|-------|
| a) 8  | b) 16 |
| c) 32 | d) 64 |
- 3) The PSW is the \_\_\_\_\_ of 8051 microcontroller.

|                  |                       |
|------------------|-----------------------|
| a) data register | b) interrupt register |
| c) flag register | d) Timer register     |
- 4) The \_\_\_\_\_ register is used to store remainder after the execution of DIV A, B.

|            |       |
|------------|-------|
| a) A       | b) B  |
| c) A and B | d) R0 |
- 5) In case of 8051 microcontroller which of the following instruction belongs to immediate addressing mode?

|               |                |
|---------------|----------------|
| a) MOV A, F5H | b) MOV A, #06H |
| c) MOV A, 3AH | d) MOV A, @R1  |
- 6) The registers \_\_\_\_\_ are normally used for indirect addressing mode.

|              |              |
|--------------|--------------|
| a) R1 and R2 | b) R0 and R2 |
| c) R0 and R1 | d) R0 and R7 |
- 7) The 8051 microcontroller has \_\_\_\_\_ I/O port pins for interfacing purpose.

|       |       |
|-------|-------|
| a) 8  | b) 16 |
| c) 32 | d) 40 |
- 8) LJMP instruction can be used to call subroutines located within \_\_\_\_\_ Byte address space of the 8051.

|        |        |
|--------|--------|
| a) 64K | b) 2K  |
| c) 256 | d) 128 |
- 9) Mode 2 of Timer 0 or Timer 1 of 8051 microcontroller is \_\_\_\_\_ mode.

|                      |                       |
|----------------------|-----------------------|
| a) 16-bit            | b) 16-bit auto reload |
| c) 8-bit auto reload | d) 8-bit              |

10) To mask lower nibble of a byte, it should be logically AND with \_\_\_\_\_ number.

- |        |        |
|--------|--------|
| a) F0H | b) FEH |
| c) EFH | d) 0FH |

**B) State true or False.**

**06**

- 1) The microprocessor is one of the most important components of a digital computer and actually acts as a brain of a computer system.
- 2) The 8051 microcontroller has five interrupts and out of these 1 external interrupts, 2 timer interrupts and 2 serial port interrupts.
- 3) The synonym of ALE is Address Light Enable.
- 4) The 8051 microcontroller has two 8 bit timers/counters called T0 and T1.
- 5) Register PCON controls processor power down, sleep modes and serial data baud rate.
- 6) The Data Pointer, DPTR, is a special 16 bit register used to address the external code or external data memory.

**Q.2 Solve any Eight of the following.**

**16**

- a) State salient features of 8051 microcontroller.
- b) Mention the names of any four SFRs.
- c) Draw RESET circuit for 8051 microcontroller.
- d) Give the role of  $\overline{EA}$  pin in 8051.
- e) Explain AND and OR instructions with suitable examples.
- f) Illustrate, with suitable example, the instruction MUL AB.
- g) Explain the concept of subroutine.
- h) Describe register addressing mode.
- i) Mention any four instructions of Branch control group.
- j) Give modes of serial data communication.

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Describe pin configuration of microcontroller 8051.
- 2) Give the comparison between microprocessor and microcontroller
- 3) Write a note on interrupts in 8051.

**B) Explain organization of on chip memory of microcontroller 8051.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) Draw the block diagram of 8051 and explain functions of the block in brief.
- 2) Explain PSW and stack pointer of 8051 microcontroller.
- 3) Write an Assembly Language Program to generate a square wave of 5 KHz on port pin P1.3 Use Timer-1 in Mode-2 and assume crystal frequency of 12 MHz.

**B) Give the classification of instruction set of 8051. With suitable examples explain each group in brief.**

**08**

**Q.5 Attempt any Two of the following.**

**16**

- a) Write the Assembly Language Program to
  - 1) Toggle the bits of port 1 and 2.
  - 2) separate the nibbles of hex number 45H and store it at memory.
- b) Write an Assembly Language Program to.
  - 1) to mask LSB and MSB of the byte
  - 2) Program for Logical XORing of two nos. stored at 6050 & 6051.
- c) What do you mean by serial communication facility of 8051 microcontroller? With suitable assembly language program, explain serial transmission.

**Seat  
No.**

## Max. Marks: 80

**10**

- Page 1 of 2

**B) Fill in the Blanks.****06**

- 1) JVM stands for \_\_\_\_\_.
- 2) \_\_\_\_\_ Keyword is used to prevent method overriding.
- 3) \_\_\_\_\_ Component in AWT that can contain other components like buttons, labels etc?
- 4) In Java default priority of thread is \_\_\_\_\_.
- 5) \_\_\_\_\_ keyword is used to call base class constructor in derived class.
- 6) \_\_\_\_\_ Keyword is used to implement interface in the class.

**Q.2 Answer the followings (Any Eight)****16**

- a) What is use of super keyword?
- b) Write a note on JCheckBox.
- c) Write a note on ArrayList.
- d) Write a note Thread priorities.
- e) Define abstract class.
- f) What is Event?
- g) Define constructor.
- h) List out advantages of collection.
- i) Use of final keyword.
- j) JVM

**Q.3 A) Answer the followings. (Any two)****10**

- 1) What is exception? How to handle exception in java?
- 2) Explain the features of java.
- 3) Write a program to demonstrate that use of 'super' keyword.

**Q.3 B) What is method overriding? Explain.****06****Q.4 A) Answer the following. (Any Two)****08**

- 1) What is interface? Explain with example.
- 2) List out Difference AWT and swing.
- 3) Explain file reader and file writer.

**Q.4 B) Write a program for constructor overloading.****08****Q.5 Answer the following. (Any Two)****16**

- a) What is Inheritance? Explain types of Inheritance.
- b) Explain thread life cycle.
- c) Explain data types in Java.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|





**Q.5 Attempt any Two of the following.****16**

- a) State D'Alembert's principle. Obtain Lagrange's equation from D'Alembert's principle.
- b) Derive expressions for time of flight and range of flight of a projectile moving in resistive medium.
- c) Deduce Lagrange's equation from Hamilton's principle.

Set P

**B) Write One sentence answer.**

- 1) Write basic principle involved in mass spectroscopy.
- 2) What is reactive methylene group?
- 3) What is selection rule?
- 4) Write the product formed when benzamide reacts with NaOBr.
- 5) What is meant by (M + 1) peak in mass spectroscopy?
- 6) What is a chemical shift?

**Q.2 Solve any Eight of the following.**

16

- a) Write note on finger print region.
- b) What are metastable ions?
- c) Write reactions involved in conversion of acetophenone to  $\beta$ -methyl cinnamic acid.
- d) Write two applications of mass spectroscopy.
- e) What are isotope ions?
- f) Write the preparation of anthranilic acid from phthalic anhydride.
- g) Write one synthetic application for MPV reduction.
- h) State nitrogen rule.
- i) Write statement with one example of Reformatsky reaction.

**Q.3 A) Attempt any Two of the following.**

10

- 1) What are Ylides? Explain Wittig reaction with mechanism.
- 2) Explain syn addition and anti-addition with respect to bromination of 2-butene.
- 3) Explain magnetic and non-magnetic nuclei.

**B) Explain the term spin-spin coupling. How many signals are expected from?**

06

- 1) isobutane
- 2) 1, 2 dichloroethane
- 3) Propane
- 4) ethanol

**Q.4 A) Attempt any Two of the following.**

08

- 1) Explain bending or deformation vibrations in covalent bonds.
- 2) Explain keto-enol tautomerism with ethylacetoacetate.
- 3) Write note on conformation and stability of methyl cyclohexane.

**B) Explain conformations and stability of cyclohexane with energy profile diagram.**

08

**Q.5 Attempt any Two of the following.**

16

- a) Explain NMR instrument with diagram. Write note on shielding and deshielding.
- b) Explain the mechanism for claisen condensation for EAA. How will you prepare methyl ethyl aceto acetate and butanoic acid from ethylacetoacetate?
- c) Explain double beam spectrophotometer with diagram. Explain Hook's law.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper - XI)**  
**Molecular Biology**

Day & Date: Tuesday, 31-01-2023  
 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 logarithmic table and calculator is allowed.  
 4) Draw neat diagrams and give equation wherever necessary.

**Q.1 A) Rewrite the sentence by using correct alternative. 10**

- 1) Operon hypothesis is put forth by \_\_\_\_\_.  
 a) Gilbert and Muller                      b) Hershey and Chase  
 c) Griffith                                      d) Jacob and Monod
- 2) In prokaryotes \_\_\_\_\_ type of ribosomes are found.  
 a) 70 S                                          b) 80 S  
 c) 90 S                                          d) 50 S
- 3) When the RNA polymerase recognizes the promoter region, \_\_\_\_\_ factor is released and transcription proceeds.  
 a) sigma                                          b) gamma  
 c) alpha                                          d) beta
- 4) The DNA strand which is used in RNA synthesis is called \_\_\_\_\_ strand.  
 a) promoter                                      b) coding  
 c) template                                      d) TATA
- 5) In lac operon, lac-A gene is responsible for synthesis of \_\_\_\_\_ enzyme.  
 a) Permease                                      b) Transacetylase  
 c) Beta galactosidase                      d) Amylase
- 6) In lac operon, i gene is responsible for synthesis of \_\_\_\_\_ protein.  
 a) Inducer                                          b) Promoter  
 c) Repressor                                      d) Inhibitor
- 7) Nucleic acid is polymer or biomolecule which is made up of \_\_\_\_\_ carbon sugars and phosphate groups.  
 a) 6                                                  b) 5  
 c) 8                                                  d) 9
- 8) Nucleotides are monomers made up of \_\_\_\_\_ components.  
 a) Pentose Sugar                                  b) Phosphate groups  
 c) Nitrogen base                                  d) all of these
- 9) \_\_\_\_\_ is known as Kornberg's enzyme.  
 a) DNA Polymerase-I                          b) Amylase  
 c) Helicase                                          d) Peptidase

- 10) Ribosomes are not present in \_\_\_\_\_.  
 a) Chloroplast                      b) Mitochondria  
 c) Cytoplasm                        d) Nucleus

**B) Answer the following questions.**

**06**

- 1) Griffith used \_\_\_\_\_ bacterium in his experiments.
- 2) Friedrich Miescher isolated nuclein from \_\_\_\_\_ cells.
- 3) Eukaryotes have \_\_\_\_\_ type of ribosomes.
- 4) Replication of DNA is semiconservative. True or False?
- 5) Process of RNA formation from DNA is called \_\_\_\_\_.
- 6) Lac operon was discovered in which bacterium?

**Q.2 Solve any Eight of the following.**

**16**

- a) What are nucleic acids? Give examples.
- b) Enlist different types of DNA and RNA.
- c) What is replication of DNA?
- d) Sketch and label any type of RNA.
- e) Name any two enzymes involved in replication.
- f) Name any two enzymes involved in transcription.
- g) What is essential for transcription?
- h) What is essential for translation?
- i) What are steps involved in transcription?
- j) What are the chemical components of DNA?

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Describe the Griffith's experiment.
- 2) Give salient features of DNA double helix.
- 3) Describe principles of transcriptional regulation.

**B) Write a note on organization of DNA in prokaryotes.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) Sketch and label - Watson and Crick model of DNA.
- 2) Write a note on Kornberg's discovery of DNA synthesis.
- 3) Give different transcription factors and describe their roles.

**B) Explain regulation of lactose metabolism in *E. coli*.**

**08**

**Q.5 Attempt any Two of the following.**

**16**

- a) Write a note on - transcription in prokaryotes.
- b) Describe the steps involved in protein synthesis.
- c) With neat labelled diagram explain replication of DNA in prokaryotes.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Special Paper - XI)**  
**Endocrinology**

Day & Date: Tuesday, 31-01-2023  
 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 logarithmic table and calculator is allowed.  
 4) Draw neat labelled diagrams wherever necessary.

**Q.1 A) Multiple choice question.****10**

- 1) The pineal gland secretes the hormone \_\_\_\_\_ which helps to regulate biological rhythms.
  - a) Dopamine
  - b) Melatonin
  - c) LTH
  - d) Glucagon
- 2) The condition associated with the onset of hypersecretion of growth hormone in adults is known as \_\_\_\_\_.
  - a) Gigantism
  - b) Dwarfism
  - c) Acromegaly
  - d) Goitre
- 3) \_\_\_\_\_ is the primary target of the releasing and inhibiting hormones of the hypothalamus.
  - a) Liver and adipose tissue
  - b) Gonads
  - c) Anterior pituitary
  - d) Bone marrow
- 4) The hormone made by the posterior pituitary is \_\_\_\_\_.
  - a) FSH
  - b) LH
  - c) ACTH
  - d) ADH
- 5) ICSH in male acts on \_\_\_\_\_.
  - a) Cells of Leydig
  - b) Sertoli cell
  - c) Spermatids
  - d) Spermatogonia
- 6) Milk secretion is stimulated by \_\_\_\_\_ hormone.
  - a) oxytocin
  - b) progesterone
  - c) LH
  - d) prolactin
- 7) Chemically hormones are \_\_\_\_\_.
  - a) biogenic amines only
  - b) proteins, steroids and biogenic amines
  - c) proteins only
  - d) steroids only
- 8) \_\_\_\_\_ is a secondary messenger.
  - a)  $\text{Ca}^{2+}$
  - b)  $\text{Mg}^{2+}$
  - c)  $\text{Na}^+$
  - d)  $\text{K}^+$
- 9) Hormone receptors are \_\_\_\_\_.
  - a) glycolipids
  - b) lipids
  - c) polysaccharides
  - d) proteins

- 10) Human Placental Lactogen (hPL) \_\_\_\_\_.  
 a) promotes mammary gland growth in preparation for lactation  
 b) prepares the placenta for delivery  
 c) ensures the lining of the uterus stays intact during the pregnancy  
 d) maintains the corpus luteum during pregnancy

**B) Fill in the blanks/Definition/One sentence answer/One word answer      06**  
**Give the name/Predict the product etc.**

- 1) \_\_\_\_\_ hormone is responsible for maintenance of pregnancy.  
 2) \_\_\_\_\_ hormone secreted by pituitary gland responsible for skin pigmentation.  
 3) Hormone \_\_\_\_\_ is responsible for relaxation of pelvic ligament during birth of child.  
 4) Cushing's syndrome in hyperpituitarism is due to excess secretion of \_\_\_\_\_ hormone.  
 5) Acidophil cells of anterior pituitary gland secrete \_\_\_\_\_ hormones.  
 6) Testosterone is \_\_\_\_\_ type of hormone.

**Q.2 Solve any Eight of the following.      16**

- a) CRH  
 b) Structure of placenta  
 c) Structure of hypothalamus  
 d) Hormones of posterior pituitary  
 e) GPCR  
 f) Neurohormones  
 g) Structure of Testis  
 h) Pineal gland  
 i) Disorders of ovary  
 j) GnRH

**Q.3 A) Attempt any Two of the following.      10**

- 1) Explain types of hormone receptors.  
 2) Explain brief function of epiphysis.  
 3) Hormonal regulation of testis.

**B) Describe hypothalmo-hypophysial portal system.      06**

**Q.4 A) Attempt any Two of the following.      08**

- 1) Explain the functions of placenta.  
 2) Describe the classification of hormones.  
 3) Explain Molecular mediators in hormonal action.

**B) Explain hormones of adenohypophysis.      08**

**Q.5 Attempt any Two of the following.      16**

- a) Disorders of pituitary gland.  
 b) Explain in detail hormone action at cellular level.  
 c) Explain regulation of neuroendocrine glands.



**Seat  
No.**

## Max. Marks: 80

- 1) If  $f: A \rightarrow B$  and  $f$  is one-one then the domain of  $f^{-1}$  is \_\_\_\_\_.  
 a) Range of  $f$   
 b) co-domain of  $f$   
 c) Range of  $f^{-1}$   
 d) domain of  $f$
  
- 2) Which of the following is one-one function?  
 a)  $f(x) = e^x, (-\infty < x < \infty)$   
 b)  $f(x) = x^2, (-\infty < x < \infty)$   
 c)  $f(x) = e^{x^2}, (-\infty < x < \infty)$   
 d) All of these
  
- 3) If  $f: R \rightarrow R$  such that  $f(x) = \frac{x-2}{x+3}$  then  $f^{-1}(x) =$  \_\_\_\_\_.  
 a)  $\frac{x+3}{x-2}$   
 b)  $\frac{x+1}{x-1}$   
 c)  $\frac{3x+2}{1-x}$   
 d)  $\frac{x+3}{x+1}$
  
- 4) If A and B are subset of  $R$  then \_\_\_\_\_.  
 a)  $(A \cap B)' \subseteq A' \cap B'$   
 b)  $(A \cap B)' \supseteq A' \cap B'$   
 c)  $(A \cap B)' = A' \cap B'$   
 d)  $(A \cap B)' = A' \cup B'$
  
- 5)  $\lim_{n \rightarrow \infty} \left( \frac{n}{n+2} \right) =$  \_\_\_\_\_.  
 a) 1  
 b) 0  
 c)  $\infty$   
 d)  $\frac{1}{2}$
  
- 6) For the sequence 1, -4, 7, -10, 13, \_\_\_\_\_ which of the following is a sub-sequence?  
 a) 7, -4, 13, -10, ... ..  
 b) 1, 7, 13, ... ..  
 c) -4, -10, -16, ... ..  
 d) all of these
  
- 7) The sequence  $\left\{ 1, -\frac{1}{2}, \frac{1}{3}, -\frac{1}{4}, \frac{1}{5}, \dots \dots \right\}$  is \_\_\_\_\_.  
 a) convergent  
 b) divergent  
 c) oscillatory  
 d) strictly increasing

**8)** The series  $\sum_{n=1}^{\infty} \frac{1+n}{1+3^n}$  is \_\_\_\_\_.  
 a) convergent  
 b) oscillates  
 c) divergent  
 d) all of these

- 9)** The series  $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^P}$  converges if \_\_\_\_.
- a)  $P > 1$                       b)  $P < 1$   
c)  $P = 1$                         d)  $P = 0$
- 10)** I) If  $\Sigma a_n$  converges absolutely the  $\Sigma a_n$  is convergent.  
II) If  $\Sigma a_n$  is convergent then  $\Sigma a_n$  converges absolutely.
- a) I) is true and II) is false          b) I) is false and II) is true  
c) Both I) and II) is true             d) Both I) and II) is false

**B) Fill in the blanks.**

06

- 1) If  $f: A \rightarrow B$  and  $X \subset A$  Define  $g: X \rightarrow A$  by  $g(x) = f(x) \quad \forall x \in X$  then  $g$  is called \_\_\_\_\_.
- 2) A set  $A$  is countable, if  $A$  is equivalent to the set of \_\_\_\_\_.
- 3) A sequence is a function from \_\_\_\_\_ to the set of real number.
- 4) Consider the sequence  $\{-1, 1, -2, 1, -3, 1, -4, 1, \dots\}$  then  $\lim_{n \rightarrow \infty} \sup$  of this sequence is \_\_\_\_\_.
- 5) If  $\sum a_n$  is convergent series then  $\lim_{n \rightarrow \infty} a_n =$  \_\_\_\_\_.
- 6) If  $\sum a_n$  is absolutely convergent series and  $\{b_n\}$  is bounded sequence then  $\sum a_n b_n$  is \_\_\_\_\_.

**Q.2 Attempt any Eight of the following.**

16

- a) If the function  $f(x) = \log x$  for  $x \in (0, \infty)$ . If  $A = [0,1]$  and  $B = [1,3]$  find  $f^{-1}(A)$  and  $f^{-1}(A \cup B)$
- b) Prove that the set  $\{1,4,9,16,25, \dots\}$  is countable.
- c) Define, Difference and symmetric difference of two sets.
- d) If  $\lim_{n \rightarrow \infty} s_n = L$  and  $\lim_{n \rightarrow \infty} t_n = M$  then prove that  $\lim_{n \rightarrow \infty} (s_n - t_n) = L - M$
- e) Show that the limit of the sequences  $s_n = \{(-1)^n\}_{n=1}^{\infty}$  does not exist.
- f) Define bounded sequence and gives one example.
- g) Define limit superior and limit inferior of sequence.
- h) Discuss the convergence of the series  $\sum \frac{n+2}{10^{10}(n+3)}$
- i) Define alternating series with example.
- j) State comparison test of series.

**Q.3 A) Attempt any Two of the following.**

10

- 1) Define countable set and prove that, if A and B are countable sets then  $A \times B$  is also countable.
- 2) Prove that a sequence  $\{s_n\}_{n=1}^{\infty}$  of real numbers is convergent iff it is Cauchy sequence.
- 3) If  $\sum_{n=1}^{\infty} a_n$  is divergent series of positive numbers then prove that there is a sequence  $\{E_n\}_{n=1}^{\infty}$  of positive number which converges to zero but  $\sum_{n=1}^{\infty} E_n a_n$  Diverges.

**B)** If  $f: A \rightarrow B$  and  $X \subset A, Y \subset B$  then show that  $f(X \cup Y) = f(X) \cup f(Y)$

06

**Q.4 A) Attempt any Two of the following.** **08**

- 1) If  $A$  and  $B$  are subset of  $S$  then prove that  $(A \cup B)' = A' \cap B'$
- 2) Prove that every convergent sequence converges to unique limit.
- 3) Prove that the series  $\sum (-1)^n [\sqrt{n^2 + 1} - n]$  is conditionally convergent,

**B)** For any  $a, b, \in \mathbb{R}$  Prove that  $||a| - |b|| \leq |a - b|$ , hence prove that if  $\{s_n\}_{n=1}^{\infty}$  converges to  $L$  then  $\{|s_n|\}$  converges to  $|L|$ . **08**

**Q.5 Attempt any Two of the following.** **16**

- a) Prove that if  $A_1, A_2, A_3, \dots$  are countable sets the  $\bigcup_{n=1}^{\infty} A_n$  is countable  
hence show that the set of all rational number is countable.
- b) Prove that every bounded sequence of real number has a convergent subsequence.
- c) State and prove Ratio test for the absolute convergence of series and hence test the convergence of the series  $\sum \frac{n^n}{n!}$  is convergent.

**Seat  
No.**

## Max. Marks: 80

10

- Page 1 of 3

- 8) There are more chances of non-sampling errors than sampling errors in case of \_\_\_\_\_.  
 a) Studies of large samples      b) Complete enumeration  
 c) Inefficient investigators      d) All of the above
- 9) 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
- 10) In presence of linear trend \_\_\_\_\_ method is more efficient.  
 a) Stratified      b) Systematic  
 c) SRSWOR      d) SRSWR

**B) Define the following.**

**06**

- 1) Sampling unit
- 2) Sampling frame
- 3) Random sampling
- 4) Non-random sampling
- 5) Non-sampling error
- 6) Sampling error

**Q.2 Solve any Eight of the following.**

**16**

- a) Define census method.
- b) Give any two real life situations where census method is not preferable over sampling.
- c) State characteristics of a good questionnaire.
- d) Give a real life situation where stratification can be used.
- e) What is meant by proportional allocation?
- f) State the objectives of a sample survey.
- g) Give a real life situation where cluster sampling is used.
- h) State the advantages of sampling method over census method.
- i) Distinguish between random sampling and non-random sampling.
- j) Give a real life situation where Ratio method is appropriate.

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Find under what condition ratio estimate is more efficient than SRS.
- 2) Explain sampling for proportion. Obtain its unbiased estimator for population proportion.
- 3) Explain regression estimators of population mean and population total.

**B) Write a short note on systematic sampling.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) Show that ratio estimator is a biased estimator. Obtain an expression for the bias in estimator.
- 2) Describe stratified random sampling procedure and state unbiased estimator of population total.
- 3) Describe, in brief, the cluster sampling.

**B) Describe the idea of two-stage and multi-stage sampling in detail**

**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. Also prove that proportional allocation has better precision than simple random sample.
- b) For stratified sampling, obtain unbiased estimator of population mean. Also obtain standard error of the estimator.
- c) Discuss in detail about the determination of the sample size.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

|            |          |
|------------|----------|
| <b>Set</b> | <b>P</b> |
|------------|----------|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022****GEOLOGY (Special Paper - XI)****Applied Geology – Engineering Geology**

Day & Date: Tuesday, 31-01-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Fill in the blanks. 10**

- 1) Preparation of geological map is done in the \_\_\_\_\_ stage of the civil engineering project.
  - a) planning stage
  - b) post construction stage
  - c) design stage
  - d) construction stage
- 2) Which of the following test can detect presence of subsurface unconformity?
  - a) Photogeological interpretation
  - b) seismic
  - c) drill core
  - d) magnetic survey
- 3) Electrical resistivity method is based on measurement of \_\_\_\_\_.
  - a) Specific resistance
  - b) Voltage
  - c) Potential drop
  - d) Current
- 4) Which type of compressive strength is taken as the most important index property of stones?
  - a) Confined
  - b) Drained
  - c) Undrained
  - d) Unconfined
- 5) According to engineering classification rocks, rocks with compressive strength 1120 - 2240 kg/cm<sup>3</sup> are classified as \_\_\_\_\_.
  - a) medium strength type and class C
  - b) medium strength type and class B
  - c) high strength type and class B
  - d) high strength type and class C
- 6) Moderately altered / weathered rocks occur in \_\_\_\_\_ grade of soil.
  - a) III
  - b) IV
  - c) V
  - d) VI
- 7) Which type of mass movement occurs on gentle slope whose angle between 2° and 5°?
  - a) Creep
  - b) Rapid flowage
  - c) Sliding
  - d) Toppling
- 8) The type of dam that requires an impermeable membrane is:
  - a) Concrete dam
  - b) Rock-fill dam
  - c) Earth dam
  - d) Masonry dam

- 9) A tunnel passing through core of syncline and align parallel to fold axis is \_\_\_\_\_ site.
- |                   |                 |
|-------------------|-----------------|
| a) Favourable     | b) unfavourable |
| c) Both a) and b) | d) cannot say   |
- 10) Two types of embankment dams are:
- |                             |                      |
|-----------------------------|----------------------|
| a) Weirs and bandhara       | b) arch and buttress |
| c) Earth fill and rock fill | d) gravity and arc   |

**B) Answer the following questions in one sentence.**

**06**

- 1) In which stage of the civil engineering project, geophysical surveys are carried out?
- 2) What is the purpose of Auger drilling method?
- 3) Which rock material can be used as a roofing material?
- 4) Siliceous sandstone has more porosity than calcareous sandstone. True/false.
- 5) What is alluvial soil?
- 6) Which type of dam usually has a triangular profile and can resist the forces by its own weight?

**Q.2 Answer the following questions. (Any Eight)**

**16**

- a) Name three major types in classification of mass movement.
- b) What are the particle sizes of aeolian soil?
- c) What is overburden in civil engineering?
- d) What is crown of tunnel?
- e) What are heel and toe of the dam?
- f) Name the types of dams.
- g) What are lahars?
- h) Define rock mechanics.
- i) Give mathematical expression of uniaxial compressive strength.
- j) What are three types of aerial photographs?

**Q.3 A) Answer the following questions. (Any Two)**

**10**

- 1) What is sliding?
- 2) What are utilities of dams?
- 3) Write a note on tensile strength.

**B)** Write a short note on feasibility / design stage of site investigations.

**06**

**Q.4 A) Answer the following questions. (Any Two)**

**08**

- 1) Describe in brief hydraulic and traffic tunnels.
- 2) Classification of soils depending upon grades of weathering.
- 3) What are methods of sub-soil exploration?

**B)** Explain role of gravity in mass movement.

**08**

**Q.5 Answer the following questions. (Any Two)**

**16**

- a) What is shear strength? Explain it with appropriate figure.
- b) Describe various concrete dams.
- c) Describe various geological structures which may cause landslide event.





- 8)** Serum sickness is example of \_\_\_\_\_ hypersensitivity.  
a) Type I                                      b) Type II  
c) Type III                                    d) Type IV
- 9)** \_\_\_\_\_ Blood group is called universal blood acceptor.  
a) A                                                b) B  
c) AB                                             d) O
- 10)** \_\_\_\_\_ lymphocyte involved in CMI.  
a) B                                                b) T  
c) Macrophage                                d) Neutrophils

**B) Define the following.**

06

- 1) Define complement.
- 2) Define allograft.
- 3) Define blood transfusion.
- 4) Define Autoimmunity.
- 5) Define allergen.
- 6) Define secondary immune response.

**Q.2 Solve any eight of the followings.**

16

- 1) What is humoral immunity?
- 2) What are the biological effects of complement?
- 3) What is phagocytosis?
- 4) What is hemolytic anemia?
- 5) T lymphocyte.
- 6) What is Xenograft?
- 7) Rh blood grouping.
- 8) Serum sickness.
- 9) What is MALT?
- 10) Define cell mediated immunity.

**Q.3 A) Attempt any two of the following.**

10

- 1) Describe in detail mechanism of graft rejection.
- 2) Discuss in brief ABO blood grouping.
- 3) Discuss in brief classical complement pathway.

**B)** Define monoclonal antibody. Discuss in brief hybridoma technology.

06

**Q.4 A) Attempt any two of the following**

08

- 1) Give a detailed account on alternate pathway of complement.
- 2) Give a brief account on structure of thymus.
- 3) Discuss in brief applications of monoclonal antibody.

**B)** Discuss in detail delayed type of hypersensitivity.

08

**Q.5 Attempt any two of the following.**

**16**

- a)** Describe in detail structure and role of MHC I and MHC II.
- b)** Describe in detail immediate type of hypersensitivity.
- c)** Give a detailed account on organ specific autoimmunity.

**Seat  
No.**

## Max. Marks: 80

10

- Page 1 of 2

- B) Give one sentence answer. 06**
- 1) What is Passive transducer?
  - 2) Enlist the temperature transducers.
  - 3) Define accuracy of measurement system.
  - 4) Define sensitivity of measurement system.
  - 5) Give the two names of Active Transducer.
  - 6) Draw the symbol of Phototransistor.
- Q.2 Solve any Eight of the following. 16**
- a) What is need of system calibration?
  - b) What is the basic needs of measurement?
  - c) What is actuator? Give one example.
  - d) What is LDR?
  - e) Give the difference between Active and Passive sensors.
  - f) Give the principle of operation of capacitive transducers.
  - g) Draw diagram of optocoupler.
  - h) Draw the diagram of Resistive Position transducer.
  - i) Give the principle of operation of Inductive Transducer.
  - j) Give basic difference between Sensors and Transducer.
- Q.3 A) Attempt any Two of the following. 10**
- 1) Explain the construction and working of Electromagnetic Relay.
  - 2) Give brief account of static and dynamic characteristics of instrument.
  - 3) Write a note on capacitor microphone.
- B) Write a note on piezoelectric transducer. 06**
- Q.4 A) Attempt any Two of the following. 08**
- 1) Explain the PIR sensor.
  - 2) Write a note on Potentiometer.
  - 3) Write a note on RTD.
- B) Explain the Hall effect transducer. 08**
- Q.5 Attempt any Two of the following. 16**
- a) Explain working of LVDT with neat diagram.
  - b) Draw the block diagram of measurement system and explain in brief.
  - c) Explain Thermocouple in brief.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Special Paper - XI)**  
**Operating System**

Day & Date: Tuesday, 31-01-2023  
 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.

**Q.1 A) Multiple choice question.**

**10**

- 1) PCB stands for \_\_\_\_\_.  
 a) Program Control Block      b) Program Central Block  
 c) Process Control Block      d) Process Central Block
- 2) For DEADLOCK DETECTION \_\_\_\_\_ Graph is used in Single Instance Resource Type.  
 a) Resource Allocation      b) Variant  
 c) Wait-For-a      d) None
- 3) \_\_\_\_\_ is the mechanism that brings a page into memory only when it is needed.  
 a) Overlays      b) Fragmentation  
 c) Demand Paging      d) Segmentation
- 4) \_\_\_\_\_ scheduler select which processes should be brought into the ready queue.  
 a) Real-term      b) Long-term  
 c) Mid-term      d) Short-term
- 5) Priority scheduling is \_\_\_\_\_.  
 a) Non-Pre-Emptive scheduling  
 b) Pre-Emptive scheduling  
 c) Fast scheduling  
 d) Page scheduling
- 6) Loading of different routines at EXECUTION TIME is known as \_\_\_\_\_.  
 a) Dynamic Linking      b) swapping  
 c) Dynamic Loading      d) Dynamic Routine
- 7) A page fault rate is high in \_\_\_\_\_ page replacement algorithm.  
 a) SJF      b) FIFO  
 c) LRU      d) Optimal
- 8) A Directed edge from  $R_j \rightarrow P_i$  in RAG is called as \_\_\_\_\_ Edge.  
 a) Request      b) Assignment  
 c) Claim      d) Wait
- 9) \_\_\_\_\_ is a process synchronization tool operates on two atomic operations.  
 a) Socket      b) Reader  
 c) Writer      d) Semaphore

- 10) Paging suffers from External fragmentation.**
- a) TRUE                                      b) FALSE

**B) Define the following terms.**

06

- 1) Process.
- 2) Co-operating Processes
- 3) Throughput
- 4) Page fault
- 5) Boot block
- 6) Virtual Machine

**Q.2 Solve any Eight of the following.**

16

- a) Define Context Switching with its Drawback.
- b) List TWO differences between process and program.
- c) Define Thrashing.
- d) List out any FOUR usage of Operating System.
- e) Define Internal and External Fragmentation.
- f) What is CPU Bound Process?
- g) Define Logical Address Space.
- h) State the purpose of Overlays.
- i) Define Race Condition.
- j) What is Compaction?

**Q.3 A) Attempt any Two of the following.**

10

- 1) Explain OS Structure with Diagram.
- 2) Write Note on Swapping.
- 3) Consider Following System Snapshot,

| Process      | P1 | P2 | P3 | P4 | P5 |
|--------------|----|----|----|----|----|
| Arrival Time | 0  | 1  | 2  | 3  | 4  |
| CPU Burst    | 5  | 9  | 7  | 2  | 4  |

Prepare Gantt chart and calculate Average Waiting and Average Turnaround Time using, RR Scheduling Algorithm with Time Slice= 2 m/s

**B) Explain Process States with Process Life Cycle Diagram.**

06

**Q.4 A) Attempt any Two of the following.**

08

- 1) Write a note on RAG.
- 2) State any FOUR file types.
- 3) Explain TWO LEVEL Directory Structure in brief.

**B)** Calculate Number of Page Fault Rate for following Reference String with Frame Size = 3 using,

08

- 1) FIFO
- 2) Optimal
- 3) LRU

Reference String  $\rightarrow 5, 0, 2, 1, 0, 3, 0, 2, 4, 3, 0, 3, 2, 1, 3, 0, 1, 5.$

**Q.5 Attempt any Two of the following.**

- a) Explain Contiguous File Allocation Method.
- b) Define Schedulers and explain all 3 types of schedulers.
- c) Consider following system scenario,

| MAX |    |    |    |    |
|-----|----|----|----|----|
|     | R1 | R2 | R3 | R4 |
| P1  | 0  | 0  | 1  | 2  |
| P2  | 1  | 7  | 5  | 0  |
| P3  | 2  | 3  | 5  | 6  |
| P4  | 0  | 6  | 5  | 2  |
| P5  | 0  | 6  | 5  | 6  |

| ALLOCATION |    |    |    |    |
|------------|----|----|----|----|
|            | R1 | R2 | R3 | R4 |
| P1         | 0  | 0  | 1  | 2  |
| P2         | 1  | 0  | 0  | 0  |
| P3         | 1  | 3  | 5  | 4  |
| P4         | 0  | 6  | 3  | 2  |
| P5         | 0  | 0  | 1  | 4  |

| AVAILABLE |    |    |    |
|-----------|----|----|----|
| R1        | R2 | R3 | R4 |
| 1         | 5  | 2  | 0  |

**Solve by using Bankers Algorithms and find out,**

- 1) Contents of NEED Matrix.
- 2) Is System is in safe state?
- 3) If Process P2 arrives with request (0 4 2 0) then can it granted Or NOT.



| Set | P |
|-----|---|
| 1   | 1 |
| 2   | 1 |
| 3   | 1 |
| 4   | 1 |
| 5   | 1 |
| 6   | 1 |
| 7   | 1 |
| 8   | 1 |
| 9   | 1 |
| 10  | 1 |
| 11  | 1 |
| 12  | 1 |
| 13  | 1 |
| 14  | 1 |
| 15  | 1 |
| 16  | 1 |
| 17  | 1 |
| 18  | 1 |
| 19  | 1 |
| 20  | 1 |
| 21  | 1 |
| 22  | 1 |
| 23  | 1 |
| 24  | 1 |
| 25  | 1 |
| 26  | 1 |
| 27  | 1 |
| 28  | 1 |
| 29  | 1 |
| 30  | 1 |
| 31  | 1 |
| 32  | 1 |
| 33  | 1 |
| 34  | 1 |
| 35  | 1 |
| 36  | 1 |
| 37  | 1 |
| 38  | 1 |
| 39  | 1 |
| 40  | 1 |
| 41  | 1 |
| 42  | 1 |
| 43  | 1 |
| 44  | 1 |
| 45  | 1 |
| 46  | 1 |
| 47  | 1 |
| 48  | 1 |
| 49  | 1 |
| 50  | 1 |
| 51  | 1 |
| 52  | 1 |
| 53  | 1 |
| 54  | 1 |
| 55  | 1 |
| 56  | 1 |
| 57  | 1 |
| 58  | 1 |
| 59  | 1 |
| 60  | 1 |
| 61  | 1 |
| 62  | 1 |
| 63  | 1 |
| 64  | 1 |
| 65  | 1 |
| 66  | 1 |
| 67  | 1 |
| 68  | 1 |
| 69  | 1 |
| 70  | 1 |
| 71  | 1 |
| 72  | 1 |
| 73  | 1 |
| 74  | 1 |
| 75  | 1 |
| 76  | 1 |
| 77  | 1 |
| 78  | 1 |
| 79  | 1 |
| 80  | 1 |
| 81  | 1 |
| 82  | 1 |
| 83  | 1 |
| 84  | 1 |
| 85  | 1 |
| 86  | 1 |
| 87  | 1 |
| 88  | 1 |
| 89  | 1 |
| 90  | 1 |
| 91  | 1 |
| 92  | 1 |
| 93  | 1 |
| 94  | 1 |
| 95  | 1 |
| 96  | 1 |
| 97  | 1 |
| 98  | 1 |
| 99  | 1 |
| 100 | 1 |

- 10) Hydrons means \_\_\_\_\_.  
 a) intermediate                      b) bulky  
 c) heavy                                d) light in weight

**B) Fill in the blanks from the following. 06**

- 1) In nuclear reaction the bombarding particle is called \_\_\_\_\_.
- 2) The betatron accelerates \_\_\_\_\_ ions.
- 3) The time at which GM tube unable to count pulse is called \_\_\_\_\_.
- 4) Neutrino has \_\_\_\_\_ charge.
- 5) Antiparticle of electron is \_\_\_\_\_.
- 6) Neutron was discovered by \_\_\_\_\_.

**Q.2 Solve any Eight of the following. 16**

- a) Define Mass defect.
- b) What is pickup reaction?
- c) Explain Endothermic reaction.
- d) Define threshold energy of nuclear reaction.
- e) What is accelerator?
- f) State principle of scintillation counter.
- g) Define recovery time of GM counter.
- h) Define  $\alpha$ -disintegration energy.
- i) Give two properties of Photons.
- j) What is Electromagnetic Interaction?

**Q.3 A) Attempt any Two of the following. 10**

- 1) Obtain equation for Q-value of nuclear reaction and explain types of nuclear reactions.
- 2) Show that  $Q_\alpha = E_\alpha[1 + M_\alpha/M_Y]$
- 3) Explain the classification of elementary particles in brief.

**B) Explain liquid drop model of nucleus. 06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) Explain electrical quadrupole moment.
- 2) Obtain betatron condition and explain the construction and working of betatron.
- 3) Explain properties of elementary particles.

**B) Explain construction and working of cyclotron. What are the limitations of cyclotron? 08**

**Q.5 Attempt any Two of the following. 16**

- a) Obtain semi-empirical mass formula.
- b) Explain construction and working of GM counter. Hence explain Geiger plateau region.
- c) Explain experimental study of  $\beta$ -decay. Explain continuous  $\beta$ -ray spectrum.

**Seat  
No.**

Day & Date: Wednesday, 01-02-2023  
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.
- 4) Draw neat labelled diagrams wherever necessary.

**Q.1 A) Choose the correct alternatives for the following. 10**

- 1) In the colorimetric measurements, the light passing through the thin gold layer falls upon the selenium surface \_\_\_\_\_ are released.

a) ions                                  b) electrons  
c) protons                              d) atoms
- 2) In colorimetric measurements, the best filter is that which gives \_\_\_\_\_ transmission.

a) maximum                            b) minimum  
c) 100%                                 d) none of these
- 3) For standardization of potentiometer, a standard cell having voltage \_\_\_\_\_ is generally used.

a) 1.180 V                              b) 1.108 V  
c) 1.018 V                              d) 2.018 V
- 4) Which of the following method gives exact end point in potentiometric titrations?

a) classical                              b) first derivative  
c) second derivative                 d) none of these
- 5) In a conductance cell, the two electrodes are 0.5 m apart and have a area of cross section  $1\text{m}^2$ , then its cell constant is \_\_\_\_\_.

a)  $5\text{ m}^{-1}$                                 b)  $0.05\text{ m}^{-1}$   
c)  $50\text{ m}^{-1}$                               d)  $0.5\text{ m}^{-1}$
- 6) The conductivity water is obtained by \_\_\_\_\_ of distilled water with alkaline  $\text{KMnO}_4$

a) cooling                                 b) freezing  
c) redistillation                        d) filtration
- 7) Picking means cleaning of articles by the action of \_\_\_\_\_.

a) base                                    b) acid  
c) water                                  d) all of these
- 8) In nickel plating \_\_\_\_\_ % nickel anodes are generally used.

a) 99                                        b) 100  
c) 50                                        d) 1
- 9) The material most commonly used in making prism, in flame photometry is \_\_\_\_\_.

a) Glass                                  b) Quartz  
c) Mica                                    d) Ebonite

- 10)** When temperature of flame increases, the intensity of emitted radiation \_\_\_\_\_.  
 a) increases                      b) decreases  
 c) remains same                d) become zero

**B) Fill in the blanks.**

06

- 1) Reciprocal of resistance is known as \_\_\_\_\_.
- 2) In simple flame photometers, the monochromator is \_\_\_\_\_.
- 3) The logarithm of opacity is known as \_\_\_\_\_.
- 4) The titrations in which end points are determined by emf measurements are called \_\_\_\_\_ titrations.
- 5) In chromium plating \_\_\_\_\_ is used as anode.
- 6) For the determination of cell constant \_\_\_\_\_ electrolyte is used.

**Q.2 Solve any Eight of the following.**

16

- a) Define the term
  - 1) Opacity
  - 2) Transmittance
- b) State Lambert's law.
- c) Give the advantages of glass electrode.
- d) Give the advantages of quinhydrone electrode.
- e) Draw labelled circuit diagram of Wheatstone bridge.
- f) Why direct current source cannot be used in conductance measurements?
- g) Explain the term electroforming.
- h) Mention the electroplating equipment's.
- i) Draw the block diagram of flame photometer.
- j) What are advantages of Laminar Flow burner?

**Q.3 A) Attempt any Two of the following.**

10

- 1) Discuss the different types of conductivity cells used in conductance measurements.
- 2) Describe the sulphuric acid method in anodising.
- 3) Describe analytical methods for locating end points of potentiometric titrations.

**B)** What are the applications of flame photometry in qualitative?

06

**Q.4 A) Attempt any Two of the following.**

08

- 1) Describe the construction and working of single cell photoelectric colorimeter.
- 2) Discuss the basic principles of electroplating.
- 3) State and explain Beer's law.

**B) Describe various components of flame photometer. Give advantages of Flame Photometer.**

08

**Q.5 Attempt any Two of the following.**

16

- Describe in detail the electroplating of nickel. Give its applications.
- Explain the conductometric titration between strong acid and strong base. Give the advantages of conductometric titrations.
- Explain the potentiometric acid-base titrations.

|             |  |
|-------------|--|
| Seat<br>No. |  |
|-------------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper – XII)**  
**Plant Breeding**

Day & Date: Wednesday, 01-02-2023  
 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 tables and calculators is allowed.

**Q.1 A) Choose the correct alternatives from the options. 10**

- 1) A cross between F1 generation and recessive parent is known as \_\_\_\_\_.  
 a) Monohybrid cross                      b) Back cross  
 c) Dihybrid cross                         d) Mass selection
- 2) Male sterility in plants is associated with \_\_\_\_\_.  
 a) Pollen failure                            b) Leaf failure  
 c) stem failure                               d) Root failure
- 3) Intellectual Property Rights (IPR) protects the use of information and ideas that are of \_\_\_\_\_.  
 a) Social value                               b) Ethical value  
 c) Moral value                                d) Commercial value
- 4) \_\_\_\_\_ of the following is not ionizing radiations.  
 a) UV rays                                    b) X rays  
 c) Cosmic rays                                d) Alpha rays
- 5) Method of selection in plants showing vegetative propagation is \_\_\_\_\_.  
 a) Clonal selection                          b) Pure line selection  
 c) Pedigree selection                        d) Mass selection
- 6) Emasculation is concerned with \_\_\_\_\_.  
 a) Hybridization                            b) Clonal selection  
 c) Mass selection                            d) Pureline selection
- 7) The mutation produced by the activity of man is called \_\_\_\_\_.  
 a) Induced mutation                        b) spontaneous mutation  
 c) Gene mutation                            d) Micromutation

- 8) On the basis of causes of mutation, X-rays causing mutation is an example of \_\_\_\_\_.  
 a) Spontaneous mutation                      b) Induced mutation  
 c) Mutation                                      d) Breeding
- 9) \_\_\_\_\_ is the main aim of plant breeder.  
 a) To grow taller and taller plants  
 b) To grow only fruit  
 c) To grow only seeds  
 d) To increase the yield of grain and fruit per acre of land
- 10) The factors or agents that causes mutation are called as \_\_\_\_\_.  
 a) Mutagens                                      b) Mutation  
 c) Mutant                                          d) Gene mutation

**Q.1 B) Answer in one Sentences. 06**

- 1) Enlist the methods for self pollinated crops.
- 2) What is clone?
- 3) Define Mutation.
- 4) Define Emasculation.
- 5) Enlist method of crop improvement.
- 6) Define plant breeding.

**Q.2 Solve eight of the following. 16**

- 1) Define hybridization.
- 2) What is copyright?
- 3) Enlist the methods of emasculation.
- 4) Write advantages of pureline selection.
- 5) Define plant introduction.
- 6) What is aim of plant breeding?
- 7) Write the types of mutation.
- 8) What is the intellectual property rights?
- 9) What is recipient parent?
- 10) Write merits of bulk method.

**Q.3 A) Attempt any two of the followings. 10**

- 1) Describe trademark with example.
- 2) Describe role of mutation in plant breeding.
- 3) Describe any two old world centres of origin.

**B) Write Shorts note on 06**  
 Objectives of plant breeding.

**Q.4 A) Attempt any two of the followings. 08**

- 1) Describe types of property with example.
- 2) Describe role of polyploidy.
- 3) Write a brief description of various national crop breeding institute.

**B)** Describe procedure and advantages of Clonal Selection Method. **08**

**Q.5 Attempt any two of the followings.** **16**

- a)** Describe the procedure of hybridization.
- b)** Describe the main forms of intellectual property rights with example.
- c)** Describe role of biotechnology in crop improvement.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper - XII)**  
**Economic Botany**

Day & Date: Wednesday, 01-02-2023  
 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 logarithmic table and calculator is allowed.  
 4) Draw neat diagrams and give equation wherever necessary.

**Q.1 A) Multiple Choice Questions.****10**

- 1) Pigeon pea is the common name of \_\_\_\_\_.  
 a) *Medicago sativa*                      b) *Cajanus cajan*  
 c) *Arachis hypogaea*                      d) *Cicer arietinum*
- 2) Lucerne is the common name of \_\_\_\_\_.  
 a) *Medicago sativa*                      b) *Cajanus cajan*  
 c) *Arachis hypogaea*                      d) *Cicer arietinum*
- 3) The maximum length of lint is \_\_\_\_\_ mm.  
 a) 50                                              b) 40  
 c) 30                                              d) 10
- 4) The scientific name of coconut is \_\_\_\_\_.  
 a) *Cocos nucifera*                              b) *Gossypium hirsutum*  
 c) *Withania somnifera*                      d) None of these
- 5) Groundnut oil is \_\_\_\_\_ oil.  
 a) semi drying                                  b) drying  
 c) non drying                                  d) essential
- 6) The origin of soybean plant is \_\_\_\_\_.  
 a) South Eastern Asia                      b) West Indies  
 c) Peru                                              d) India
- 7) *Syzygium aromaticum* belongs to the family \_\_\_\_\_.  
 a) Myrtaceae                                      b) Acanthaceae  
 c) Euphorbiaceae                              d) Solanaceae
- 8) The leaves of *Adbatoda zeylanica* contain the alkaloids \_\_\_\_\_.  
 a) vasicinine                                      b) vasicinone  
 c) deoxyvasicine                              d) all the above
- 9) *Rubia cordifolia* is propagated by \_\_\_\_\_.  
 a) seed                                              b) cuttings  
 c) micropropagation                      d) all the above
- 10) The turmeric is used as \_\_\_\_\_.  
 a) antibiotic                                      b) anti-inflammatory  
 c) antidiabetic                                      d) all the above



- B) Give the one sentence answer of the following** **06**
- 1) Write one use of Coir.
  - 2) Give the scientific name of *Sesbania*.
  - 3) Write one use of *Embllica officinales*.
  - 4) Write one use of Soyabean.
  - 5) Give the scientific name of Kutch.
  - 6) Write scientific name of Rubber.
- Q.2 Solve any Eight of the following.** **16**
- a) What is legume?
  - b) Write two uses of Red Gram.
  - c) Define plant fibres.
  - d) Give the Scientific name and one use of Soyabean.
  - e) Give the two uses of Coir.
  - f) What is drug?
  - g) Explain the two use of *Withania somnifera*.
  - h) Write two morphological character of *Syzigium aromaticum*.
  - i) What is Dyes?
  - j) Write two uses of Termeric.
- Q.3 A) Attempt any Two of the following.** **10**
- 1) Explain the Botanical name, source and economic importance of Kutch.
  - 2) Give the Botanical name, morphology and importance of Neem.
  - 3) Describe the properties of rubber studied by you.
- B) Write short notes any two of the following.** **06**
- 1) Write the morphology and source of *Hevea brasiliensis*.
  - 2) Plant dyes Heena.
  - 3) Explain the source and uses of *Embllica officinales*.
- Q.4 A) Attempt any Two of the following.** **08**
- 1) Explain the morphology, source and uses of *Adhatoda zeylanica*.
  - 2) Describe the Morphology, source and uses of *Tinospora cardifolia*.
  - 3) Write botanical name, source and economic importance of Groundnut.
- B) Attempt any one of the following.** **08**
- 1) Explain the botanical name, morphology, source and economic importance of Cotton.
  - 2) Describe the botanical name, morphology, source and economic importance of Lucerne.
- Q.5 Attempt any Two of the following.** **16**
- a) Explain the botanical name, morphology, source and economic importance of Chick pea.
  - b) Describe the plant dyes Oak and Teak studied by you.
  - c) Write in details drug *Zingiber officinales*.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Special Paper - XII)**  
**Wildlife Conservation & Management**

Day & Date: Wednesday, 01-02-2023  
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 calculators is allowed.

**Q.1 A) Multiple Choice Questions.**

10

- \_\_\_\_\_ refers to the animal species that are not domesticated.
  - Wildlife
  - Biodiversity
  - Sacred groove
  - Animal husbandry
- The careful maintenance and upkeep of a natural resource to prevent it from disappearing is called \_\_\_\_\_.
  - Biodiversity
  - Conservation
  - Ecosystem
  - Ecology
- Urbanization, illegal logging, agriculture, subsistence farming, soil erosion are important causes of \_\_\_\_\_.
  - Resources depletion
  - Resources conservation
  - Biodiversity conservation
  - Mortality
- Mountains, hills, valleys, lakes, oceans, rivers, cities, dams, and roads are examples of \_\_\_\_\_.
  - Demography
  - Chromatography
  - Topography
  - Geography
- \_\_\_\_\_ is a method of measuring biological parameters from a distance.
  - Biometry
  - Biotelemetry
  - Indices
  - Census
- \_\_\_\_\_ is a system that creates, manages, analyzes, and maps all types of data.
  - GIS
  - GIB
  - GPS
  - ZSI

- 7) Responsible travel to natural areas that conserve the environment, sustains the well-being of the local people, and involves interpretation and education is called \_\_\_\_\_.  
a) Ecotourism                      b) Ecosystem  
c) Ecotone                         d) Emmigration
- 8) \_\_\_\_\_ is state, period, or place of isolation in which people or animals that have arrived from elsewhere or been exposed to infectious or contagious disease are placed.  
a) Quarantine                      b) Elimination  
c) Separation                      d) Gathering
- 9) Tadoba national park is located in \_\_\_\_\_.  
a) M.S                                b) U.P  
c) M.P                                d) U.S.
- 10) In CITES, E stands for \_\_\_\_\_.  
a) Ecosystem                      b) Ecology  
c) Endangered                    d) Environment

**B) Answer in one Sentences.****06**

- 1) Define conservation ethics.
- 2) Write names of physical parameters of wild life.
- 3) Pug marks.
- 4) Define climax.
- 5) Biotelemetry.
- 6) Examples of protected areas.

**Q.2 Answer the followings (Any Eight):****16**

- 1) What is the positive values wildlife?
- 2) What are the basic requirements of wild life?
- 3) Significance of remote sensing.
- 4) What are the different types of wildlife conservation?
- 5) What are the steps of succession?
- 6) What type of animals are ungulates?
- 7) What is the difference between the Shannon and Simpson index?
- 8) What is the difference between national park and sanctuary?
- 9) What is meant by community reserve?
- 10) State role of CITES.

**Q.3 A) Answer the followings (Any two):****10**

- 1) Causes of wildlife depletion.
- 2) Applications of biostatistics in biodiversity estimation.
- 3) GIB reserve and its management.

**B) Short note****06**

Tiger conservation.

- Q.4 A) Answer the followings (Any two):** **08**
- 1) Explain negative values of wildlife.
  - 2) Ecotourism
  - 3) Give an account on sanctuary.
- B) Describe/Explain** **08**
- Describe national parks in India.
- Q.5 Answer the following (Any Two).** **16**
- a) Describe in detail wildlife protection act-1972.
  - b) Explain care of injured and diseased animal.
  - c) Describe the international CITES 1973.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Special Paper - XII)**  
**Partial Differential Equations**

Day & Date: Wednesday, 01-02-2023  
 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 by choosing correct alternatives given below. 10**

- 1) The order and degree of the equation  $\sqrt{\left(\frac{\partial^3 z}{\partial x^3}\right)^5 + \left(\frac{\partial z}{\partial y}\right)^6} = \frac{\partial^4 z}{\partial x^2 \partial y^2}$  are respectively.
  - a) 3, 5
  - b) 4, 2
  - c) 4, 5
  - d) 4, 6
- 2) The partial differential equation  $(x^2 - yz)p + (y^2 - zx)q = z^2 - xy$  is \_\_\_\_\_.
  - a) linear
  - b) Non-linear
  - c) Quasi-linear
  - d) Semi linear
- 3) The general solution of  $xzp + yzq = xy$  is \_\_\_\_\_.
  - a)  $\phi\left(\frac{x}{y}, xy + z^2\right) = 0$
  - b)  $\phi\left(\frac{x}{y}, xy - z^2\right) = 0$
  - c)  $\phi\left(\frac{z}{y}, xy - z^2\right) = 0$
  - d)  $\phi\left(\frac{x}{z}, xy - z^2\right) = 0$
- 4) The first order partial differential equation  $p = P(x, y), q = Q(x, y)$  are compatible if and only if.
  - a)  $\frac{\partial P}{\partial y} = \frac{\partial Q}{\partial x}$
  - b)  $\frac{\partial P}{\partial x} = \frac{\partial Q}{\partial y}$
  - c)  $\frac{\partial P}{\partial x} = \frac{\partial Q}{\partial x}$
  - d) None of above
- 5) Which of the following is non-linear partial differential equation?
  - a)  $p + q = z + xy$
  - b)  $yp + xq = \frac{x^2 z^2}{y^2}$
  - c)  $p^2 + q^2 = 1$
  - d)  $x^2 zp + y^2 zq = xy$
- 6) The complete integral of  $p^2 + q^2 = 1$  is \_\_\_\_\_.
  - a)  $z = ax - y\sqrt{1 + a^2} + c$
  - b)  $z = ax + y\sqrt{1 - a^2} + c$
  - c)  $z = ax + y(1 - a^2) + c$
  - d)  $z = ax - y\sqrt{1 - a^2} + c$
- 7) The partial differential equation  $\frac{\partial z}{\partial x} = 5x - 7y, \frac{\partial z}{\partial y} = 6x + 8y$  possesses \_\_\_\_\_.
  - a) common solution
  - b) compatible
  - c) no solution
  - d) no common solution

- 8) The particular integral of  $\frac{1}{D-mD'} f(x, y)$  is \_\_\_\_\_.  
 a)  $\int f(x, c + mx) dx$                       b)  $\int f(y, c - mx) dx$   
 c)  $\int f(x, c - mx) dx$                       d)  $\int f(y, c + my) dy$
- 9) The P.I. of  $r + s = 6t = y \cos x$  is \_\_\_\_\_.  
 a)  $\sin x - y \cos x$                       b)  $\sin y - y \cos x$   
 c)  $\sin x - x \cos x$                       d)  $\cos x - y \sin x$
- 10) The auxiliary equation of  $r - 2s + t = \sin(2x + 3y)$  is \_\_\_\_\_.  
 a)  $m^2 - 2m + 1 = \sin(2x + 3y)$   
 b)  $m^2 + 2m + 1 = \sin(2x + 3y)$   
 c)  $(m - 1)^2 = 0$   
 d)  $(m + 1)^2 = 0$

**B) Fill in the blanks.****06**

- When the number of arbitrary constant is equal to the number of independent variables then by eliminating arbitrary constant we get \_\_\_\_\_ partial differential equation of order \_\_\_\_\_.
- The quasi-linear partial differential equation of order one is called as \_\_\_\_\_ equation.
- The integral which does not contains an arbitrary constant is called \_\_\_\_\_ integrals.
- The standard form II of non-linear partial differential equation of order one is \_\_\_\_\_.
- If  $a \neq 0$ , then the general solution of the equation  $(bD - aD' - C)Z = 0$  is \_\_\_\_\_.
- If  $m_1, m_2, \dots, m_n$  be  $n$  distinct roots or auxiliary equation of linear homogeneous partial differential equation then the C.F. is \_\_\_\_\_.

**Q.2 Attempt any eight of the following.****16**

- Form the partial differential equation by eliminating  $h$  and  $k$  from the equation  $(x - h)^2 + (y - k)^2 + Z^2 = \lambda^2$
- Solve  $y^2 p + x^2 q = x^2 y^2 z^2$
- Show that the differential equations  $p = x^2 - ay, q = y^2 - ax$  are compatible.
- Find complete integral of  $q = 3p^2$
- Define the term singular solution.
- Explain the method of solving standard form I of non-linear partial differential equation of order one.
- Find singular integral of the equation  $z = px + qy + \log(pq)$
- Solve  $(D^2 - D'^2 + D - D')z = e^{2x+3y}$
- Solve  $(D^3 - 4D^2 D' + 4DD'^2)z = 0$
- Solve  $r + t + 2s = 0$

**Q.3 A) Attempt any Two of the following.****10**

- Derive the partial differential equation by eliminating arbitrary function  $\phi$  from the equation  $\phi(u, v) = 0$  where  $u$  and  $v$  are functions of  $x, y, z$ .
- Find complete and singular integral of  $4(1 + z^3) = 9z^4 pq$
- Solve  $(D^3 - 6D^2 D' + 11DD'^2 - 6D'^3)z = e^{5x+6y}$

- B)** Explain the Langrange's method of solving  $Pp + Qq = R$  where  $P, Q, R$  are functions of  $x, y, z$  and hence solve  $p \tan x + q \tan y = \tan z$ .

**06**

**Q.4 A) Attempt any Two of the following.** **08**

- 1) Solve  $(y - z)p + (z - x)q = x - y$
- 2) Explain method of solving equation of the form  $f(p, q) = 0$ .
- 3) If  $F(D, D')$  be homogeneous function of  $D$  and  $D'$  of degree  $n$  then prove that  $\frac{1}{F(D, D')} \phi^{(n)}(ax + by) = \frac{1}{F(a, b)} \phi(ax + by)$  provided  $F(a, b) \neq 0$ ,  $\phi^{(n)}$  being  $n^{th}$  derivative of  $\phi$  w.r.t  $ax + by$ .

**B)** Explain Charpit's method of solving partial differential equation **08**  
 $f(x, y, z, p, q) = 0$  where  $p$  and  $q$  are independent variables and  
 $p = \frac{\partial z}{\partial x}$ ,  $q = \frac{\partial z}{\partial y}$  and hence solve  $p^2 - y^3 q = y^2 - x^2$

**Q.5 Attempt any Two of the following.** **16**

- a) Find the integral surface of the partial differential equation  $(x - y)p + (y - x - z)q = z$  through the circle  $z = 1$ ,  $x^2 + y^2 = 1$ .
- b) Explain the method of solving the equation of the form  $f_1(x, p) = f_2(y, q)$  and hence find the complete integral of  $p - 3x^2 = q^2 - y$
- c) Show that the solution of  $(D - mD')^2 z = 0$  is  $z = \phi_1(y + mx) + x\phi_2(y + mx)$  and hence solve  $(D - D')^2 Z = \tan(y + x)$

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Special Paper - XII)**  
**Mathematical Analysis**

Day & Date: Wednesday, 01-02-2023  
 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.

**Q.1 A) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) Consider the function  $f(x) = \frac{|x|}{x}$  then \_\_\_\_\_.  
 I)  $\lim_{x \rightarrow 0^+} f(x) = 1$   
 II)  $\lim_{x \rightarrow 0^-} f(x) = -1$   
 III)  $\lim_{x \rightarrow 0} f(x)$  does not exist  
 a) All I), II), III) are true                      b) Both I) and II) are false  
 c) only III) is true                                  d) I) and II) are true
- 2) The function  $y = |2 - 3x|$  is \_\_\_\_\_.  
 a) Continuous  $\forall x \in \mathbb{R}$  & differentiable  $\forall x \in \mathbb{R}$   
 b) Continuous  $\forall x \in \mathbb{R}$  & differentiable  $\forall x \in \mathbb{R}$  except  $x = \frac{3}{2}$   
 c) Continuous  $\forall x \in \mathbb{R}$  & differentiable  $\forall x \in \mathbb{R}$  except  $x = \frac{2}{3}$   
 d) Continuous  $\forall x \in \mathbb{R}$  except at  $x = 3$  and differentiable  $\forall x \in \mathbb{R}$
- 3) If the function  $f(x)$  and  $g(x)$  are continuous everywhere and  $f(1) = 2, f(3) = -4, f(4) = 8, g(0) = 4, g(3) = -6, g(7) = 0$  then  $\lim_{x \rightarrow 3} (f + g)(x) =$  \_\_\_\_\_.  
 a)  $-10$                                                   b)  $-6$   
 c)  $-4$                                                   d)  $10$
- 4) In which of the following interval the function  $f(x) = x^2 - 2x$  is strictly increasing?  
 a)  $[1, \infty)$                                               b)  $(1, \infty)$   
 c)  $(0, \infty)$                                               d)  $(-\infty, 1)$
- 5) The value of 'C' in Rolle's theorem for the function  $f(x) = \cos \frac{x}{2}$  on  $[\pi, 3\pi]$  is \_\_\_\_\_.  
 a)  $0$                                                       b)  $\frac{\pi}{2}$   
 c)  $\frac{3\pi}{2}$                                                       d)  $2\pi$
- 6) I) Rolle's theorem is applicable to  $f(x) = \tan x$  on  $\left[\frac{\pi}{4}, \frac{5\pi}{4}\right]$   
 II) A function  $f$  is not necessarily continuous on  $[a, b]$  to satisfy L.M.V.T.  
 a) Both I), II) are true                              b) Both I), II) are false  
 c) I) is true, II) is false                              d) II) is true, I) is false



- 7)** A function  $f$  is derivable on a closed interval  $[a, b]$  and  $f'(a), f'(b)$  are of opposite signs then there exist at least one point  $c$  between  $a$  and  $b$  such that \_\_\_\_\_.
- a)  $f'(c) > 0$
- b)  $f'(c) < 0$
- c)  $f'(c) = 0$
- d)  $f'(c) = \text{constant}$
- 8)** The series  $\sum_{n=1}^{\infty} 2^n \cdot z^{n!}$  converges to \_\_\_\_\_.
- a) 1
- b) 0
- c)  $\infty$
- d)  $\frac{1}{2}$
- 9)** For how many real value of  $n$  the equation  $a^{2n^2+2} = 1$  has a solution?
- a) 1
- b) 0
- c) 2
- d) 4
- 10)** If  $f(x) = \frac{1}{x} - \frac{1}{x+1}$  then what is the value of  $f(1) + f(2) + f(3) + \dots + f(10)$ ?
- a)  $\frac{9}{10}$
- b)  $\frac{10}{11}$
- c)  $\frac{11}{12}$
- d)  $\frac{12}{13}$

**B) Fill in the blanks.**

06

- 1) For given  $\epsilon > 0$  there exist  $\delta > 0$  such that  $|f(x_1) - f(x_2)| < \epsilon$  whenever  $0 < |x_1 - x_2| < \delta$ , then function  $f$  is called \_\_\_\_\_ function.
- 2) A function  $f$  is said to have discontinuity of the first kind at  $x = c$  if \_\_\_\_\_.
- 3) By addition theorem  $E(x) \cdot E(-x) =$  \_\_\_\_\_.
- 4) A function  $f(x)$  is differentiable in  $[a, b]$  if \_\_\_\_\_.
- 5) If  $f$  and  $g$  are bounded variation function then  $V(f \pm g, a, b) =$  \_\_\_\_\_.
- 6) The Maclaurin's infinite expansion of  $\log x$  is \_\_\_\_\_.

**Q.2 Solve any Eight of the following.**

16

- Find the right hand limit and left hand limit of  $f(x) = \begin{cases} \frac{|x-4|}{x-4} & , x \neq 4 \\ 0 & , x = 4 \end{cases}$
- Prove that  $\sin x$  is uniformly continuous on  $[0, \infty)$
- If  $f$  and  $g$  are continuous functions on domain  $D$  then prove that  $f + g$  is also continuous on  $D$ .
- Define increasing and decreasing functions.
- Verify the function  $f(x) = x^2 + 2x$  over  $[-2, 0]$  satisfies the criteria in Rolle's theorem.
- Discuss the derivability of the function  $f(x) = \begin{cases} x & \text{if } 0 \leq x < 1 \\ 1 & \text{if } x \geq 1 \end{cases}$
- Define the term function of bounded variation for vector valued function.
- Show that monotonic function is a function of bounded variation.
- Define generalized power function  $a^x$  and show that  $a^x a^y = a^{x+y}$
- Prove that  $\lim_{x \rightarrow 0} x \cdot \sin \frac{1}{x} = 0$

**Q.3 A) Attempt any Two of the following.**

10

- 1) Investigate the continuity of the function

$$f(x) = \begin{cases} \frac{e^{\frac{1}{x}} - e^{-\frac{1}{x}}}{e^{\frac{1}{x} + e} - e^{-\frac{1}{x}}}, & x \neq 0 \\ 0, & x = 0 \end{cases} \quad \text{at } x = 0$$

- 2) State and prove Jordan's theorem.
- 3) Obtain the power series expansion of  $\log(1+x)$

**B)** State and prove Cauchy's mean value theorem. **06**

**Q.4 A) Attempt any Two of the following.** **08**

- 1) Let  $f: [0,2] \rightarrow \mathbb{R}$  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 a function which is derivable at a point is necessarily continuous at that point.
- 3) Prove that the product of two functions of bounded variation is also of bounded variation.

**B)** If  $\lim_{x \rightarrow a} f(x) = L, \lim_{x \rightarrow a} fg(x) = M$  then prove that  $\lim_{x \rightarrow a} (f \cdot g)(x) = L \cdot M$  and  $\lim_{x \rightarrow a} \left(\frac{f}{g}\right)(x) = \frac{L}{M}$  provided  $M \neq 0$  **08**

**Q.5 Attempt any Two of the following.** **16**

- a)**
  - 1) Show that the function  $f(x) = \frac{1}{x}$  is not uniformly continuous
  - 2) Determine all the values of  $c$  which satisfies the conclusion of mean value theorem for the function  $f(x) = x^3 + 3x^2 - x$  on  $[-1,2]$
- b)** Assuming  $f''$  to be continuous on  $[a, b]$  show that  $f(c) - f(a) \frac{b-c}{b-a} - \frac{c-a}{b-a} f(b) = \frac{1}{2}(c-a)(c-b)f''(\xi)$  where  $c$  and  $\xi$  both lie in  $[a, b]$ .
- c)** State and prove Taylor's theorem remainder after  $n$  terms.

**Seat  
No.**

## Max. Marks: 80

- Page 1 of 3

- 10) Minimize  $Z =$  \_\_\_\_\_.  
 a) -Maximize ( $Z$ )                      b) -Maximize ( $-Z$ )  
 c) Maximize ( $-Z$ )                      d) None of these

**B) Fill in the blanks.****06**

- 1) The method used for solving an assignment problem is \_\_\_\_\_.
- 2) MODI method is a method of obtaining optimum solution of \_\_\_\_\_ problem.
- 3) If a feasible solution of a LPP optimizes the objective function then it is called as \_\_\_\_\_.
- 4) In sequencing problem the time during which a machine does not have a job to process is known as \_\_\_\_\_.
- 5) A given transportation problem is said to be \_\_\_\_\_ if the total supply is not equal to the total demand.
- 6) The consequence resulting from a specific combination of a decision alternative and a state of nature is a \_\_\_\_\_.

**Q.2 Solve any Eight of the following.****16**

- a) When a basic feasible solution of a L.P.P. is said to be degenerate?
- b) Define a surplus variable.
- c) Define an Assignment Problem.
- d) What is an opportunity loss in a decision making problem?
- e) Define total elapsed time in a sequencing problem?
- f) Define a LPP.
- g) State the necessary and sufficient condition for the existence of feasible solution of a transportation problem.
- h) Give the mathematical form of an assignment problem.
- i) What is a sequencing problem?
- j) Define basic feasible solution of a LPP.

**Q.3 A) Attempt any Two of the following.****10**

- 1) Write the definition and properties of random numbers.
- 2) Write the procedure of converting a sequencing problem of  $n$  jobs with 4 machines into a sequencing problem of  $n$  jobs with 2 machines.
- 3) Explain EVPI in decision making.

**B) Write the steps involved in the procedure of Monte Carlo simulation.****06****Q.4 A) Attempt any Two of the following.****08**

- 1) Write the dual of the following L.P.P. :

$$\begin{aligned} &\text{Maximize} && z_x = 3x_1 + 5x_2 + 4x_3 \\ &\text{subject to} && : \\ &&& 2x_1 + 3x_2 \leq 8 \quad 2x_2 + 5x_3 \leq 10 \quad 3x_1 + 2x_2 + 4x_3 \leq 15 \\ &&& \text{and } x_1, x_2, x_3 \geq 0. \end{aligned}$$

- 2) What is decision making under uncertainty?
- 3) Explain the procedure of generating random observations from Bernoulli distribution.

**B) Find the IBFS of the following LPP :****08**

$$\begin{aligned} &\text{Maximize } z = -2x_1 - 2x_2 \\ &\text{subject to:} \\ &3x_1 + x_2 = 3 \quad 4x_1 + 3x_2 \geq 6 \quad x_1 + 2x_2 \leq 4 \\ &\text{and } x_1, x_2 \geq 0 \end{aligned}$$

**Q.5 Attempt any Two of the following.**

- a) Find the optimal sequence in performing the following five jobs on two machines in the order  $M_1M_2$ . Processing times (in hours) are given in the following table:

| Job           | 1 | 2  | 3  | 4 | 5  | 6  | 7 |
|---------------|---|----|----|---|----|----|---|
| Machine $M_1$ | 3 | 12 | 15 | 6 | 10 | 11 | 9 |
| Machine $M_2$ | 8 | 10 | 10 | 6 | 12 | 1  | 3 |

Also find minimum total elapsed time and idle times for all machines.

- b) Find initial basic feasible solution to the following transportation problem using Matrix Minima method:

|                | D <sub>1</sub> | D <sub>2</sub> | D <sub>3</sub> | D <sub>4</sub> | D <sub>5</sub> | Availability |
|----------------|----------------|----------------|----------------|----------------|----------------|--------------|
| O <sub>1</sub> | 9              | 12             | 9              | 6              | 9              | 5            |
| O <sub>2</sub> | 7              | 3              | 7              | 7              | 5              | 4            |
| O <sub>3</sub> | 6              | 5              | 9              | 11             | 3              | 2            |
| O <sub>4</sub> | 6              | 8              | 11             | 2              | 2              | 9            |
| Requirement    | 4              | 4              | 6              | 2              | 4              |              |

- c) Suggest the best strategy using the EMV criteria for the following decision making problem:

Payoff (Profits) Table

| Strategies         | States of nature |                |                |                |
|--------------------|------------------|----------------|----------------|----------------|
|                    | S <sub>1</sub>   | S <sub>2</sub> | S <sub>3</sub> | S <sub>4</sub> |
| D <sub>1</sub>     | 20               | 15             | 12             | -3             |
| D <sub>2</sub>     | 15               | 8              | -7             | 10             |
| D <sub>3</sub>     | 5                | -10            | 15             | 12             |
| P(S <sub>i</sub> ) | 0.4              | 0.3            | 0.2            | 0.1            |

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper - XII)**  
**Regression Analysis**

Day & Date: Wednesday, 01-02-2023  
 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 labeled diagrams wherever necessary.  
 4) Use of log table and calculator is allowed.

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

**08**

- 1) In simple linear regression model  $Y = \beta_0 + \beta_1 X + \varepsilon$ ,  $X$  and  $Y$  are respectively \_\_\_\_\_.  
 a) response variable and regressor variable  
 b) response variable and predictor variable  
 c) predictor variable and response variable  
 d) slope and intercept
- 2) The sum of residuals in any regression model that contains an intercept is always \_\_\_\_\_.  
 a) zero  
 b) One  
 c) non-zero  
 d) Positive
- 3) In a simple linear model,  $Y = \beta_0 + \beta_1 X + \varepsilon$ , if we change regressor variable by 1 unit, how much response variable will change?  
 a) by 1  
 b) no change  
 c) by  $\beta_0$   
 d) by  $\beta_1$
- 4) The difference between the actual  $Y$  value and the predicted  $Y$  value found using a regression model is called the \_\_\_\_\_.  
 a) scatter plot  
 b) Residual  
 c) slope  
 d) Outlier
- 5) The coefficient of determination ( $R^2$ ) is the square of correlation coefficient between (where  $Y$  is response) \_\_\_\_\_.  
 a)  $Y$  and hat matrix  
 b)  $Y$  and its predicted value  
 c) Regressors  
 d) none of these
- 6) 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
- 7) Suppose the  $R^2$  value of a regression of  $Y$  on  $X$  is 0.64. Which of the following is necessary true?  
 a) Correlation coefficient between  $X$  and  $Y$  0.8  
 b) Correlation coefficient between  $X$  and  $Y$   $-0.8$   
 c) Correlation coefficient between  $X$  and  $Y$  0  
 d) Correlation coefficient between  $X$  and  $Y$  is either  $-0.8$  or 0.8

- 8) Logistic regression model is an appropriate model when response variable is distributed as \_\_\_\_\_.
  - a) Poisson
  - b) Binomial
  - c) Normal
  - d) Gamma
- 9) Logistic regression is used when we want to predict \_\_\_\_\_.
  - a) a dichotomous variable from continuous or dichotomous variables
  - b) a continuous from dichotomous variables
  - c) any categorical variable from several other categorical variables
  - d) a continuous variable from dichotomous or continuous variables
- 10) In a binary logistic regression \_\_\_\_\_.
  - a) the dependent variable is continuous
  - b) the dependent variable is divided into two equal subcategories
  - c) the dependent variable consists of two categories
  - d) there is no dependent variable

**B) Fill in the blanks.**

06

- 1) In a simple linear regression model, the distribution of error term is assumed to be \_\_\_\_\_.
- 2) The transformation  $\ln\left(\frac{\pi(x)}{1-\pi(x)}\right)$  is called \_\_\_\_\_.
- 3) In the regression equation,  $Y = 21 - 3X + \varepsilon$ , the slope is \_\_\_\_\_.
- 4) If in the model  $Y = \beta_0 + \beta_1 X + \varepsilon, \varepsilon \sim N(0, \sigma^2)$  then covariance between  $\bar{Y}$  and  $\hat{\beta}_1$  is \_\_\_\_\_.
- 5) In simple linear model, to test hypothesis about intercept parameter \_\_\_\_\_ test is used.
- 6) In multiple linear regression model, variance of least estimator of  $\beta$  is \_\_\_\_\_.

**Q.2 Answer the following questions. (Any Eight)**

16

- a) Explain studentized residual and briefly mention its uses.
- b) State the assumptions of error terms in a simple linear regression model.
- c) Define hat matrix  $H$ . State properties of  $H$ .
- d) Define coefficient of determination  $R^2$ .
- e) Explain the term variable selection in linear regression.
- f) Obtain the confidence interval for  $\beta_1$  in simple linear regression model.
- g) With usual notations, show that  $Cov(\hat{Y}, e) = 0$ .
- h) With usual notations, show that  $(I - H)X = 0$ .
- i) Define dichotomous independent variable with illustration.
- j) Discuss the logit transformation in the context of logistic regression model.

**Q.3 A) Answer the following questions. (Any Two)**

**10**

- 1) Describe the ANOVA approach to test the significance of regression in a simple linear regression model.
- 2) Define residual vector in regression analysis. Obtain its mean and Variance.
- 3) What is the logistic regression model? Give a real life situation when this model is appropriate.

**B)** Explain the residual plot. Outline the procedure of construction of normal probability plot.

06

- Q.4 A) Answer the following questions. (Any Two)** **08**
- 1) In multiple linear regression model  $Y = X\beta + \varepsilon$ , show that  $\hat{\beta} = \beta + (X'X)^{-1}X'\varepsilon$ .
  - 2) Describe forward selection method for variable selection and state its limitations.
  - 3) Describe the Pearson's chi-square test for goodness of fit of a logistic model.
- B) In usual notations, prove that.** **08**
- 1)  $\text{Var}(\hat{Y}) = \sigma^2 H$
  - 2)  $\text{Var}(\hat{\beta}) = (X'X)^{-1}\sigma^2$
- Q.5 Answer the following questions. (Any Two)** **16**
- a) Explain the concept of simple linear regression with illustration. Derive least squares estimators of the regression coefficients in the model.
  - b) Describe a multiple linear regression model. Stating the assumptions, obtain the mean and variance of least squares estimator (LSE)  $\hat{\beta}$  of  $\beta$
  - c) Derive the maximum likelihood estimators of parameters of a logistic regression model with one covariate.



|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**Set P****B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022****GEOLOGY (Special Paper – XII)****Applied Geology – Prospecting and Mining Geology**

Day & Date: Wednesday, 01-02-2023  
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) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) Which of the following geological criteria is used for placer deposits?  
a) Magmagenic criteria      b) Structural criteria  
c) Climatic criteria      d) All of the above
- 2) In Wenner configuration the electrodes are:  
a) Equally spaced  
b) Unequally spaced  
c) Space between current electrodes is more than the potential electrodes  
d) None of these.
- 3) Which of the following are major environmental issues involved in mining?  
a) Air pollution      b) Water pollution  
c) Soil degradation      d) All of the above
- 4) \_\_\_\_\_ sampling which best suited to bedded, banded and vein type of deposits.  
a) Grab      b) Channel  
c) Chip      d) None of the above
- 5) A series of measurements of resistivity are made by increasing the electrode spacing about a fixed point.  
a) Resistivity traversing      b) Lateral exploration  
c) Vertical exploration      d) Electrical trenching
- 6) In geophysical investigation, artificial signals are introduced into the earth and subsequently recorded after being modified by the earth materials.  
a) Gravity method      b) Magnetic method  
c) Self potential method      d) Seismic method
- 7) The amount of a particular element present in the parent rock not affected by dispersion or migration is known as:  
a) Anomaly      b) Threshold  
c) Background value      d) None of these
- 8) Which of the following geological criteria is used for coal deposits?  
a) Lithological facies      b) Structural facies  
c) Stratigraphic facies      d) All of the above

- 9)** 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
- 10)** Torsion balance surveys are conducted for:
- a) Gravity prospecting          b) Electrical prospecting  
c) Magnetic prospecting        d) Seismic prospecting

**B) Answer the following.**

06

- 1) Explain stratigraphic criteria in one sentence.
- 2) What do you mean by anomaly?
- 3) The openings in the mine, which serve as a means of entry is known as.
- 4) Define Sample.
- 5) What is Geoid?
- 6) What is true resistivity?

**Q.2 Answer the following questions. (Any Eight)**

16

- a) Define prospecting.
- b) Name two geological criteria for prospecting gold deposits.
- c) What is dispersion halo.
- d) Name any two types of Underground Mining.
- e) Name two methods of electrical survey.
- f) Give two examples of placer mining.
- g) Write any two correction data of magnetic method.
- h) Give any two environmental effects of mining.
- i) Write two sampling methods.
- j) Define curie point.

**Q.3 A) Answer the following questions. (Any Two)**

**10**

- 1) Describe any three criteria of geological prospecting.
- 2) Discuss the reduction of data for magnetic method.
- 3) Explain in note on Acid mine drainage.

**B)** Write a short note on Geochemical exploration.

06

**Q.4 A) Answer the following questions. (Any Two)**

08

- 1) Discuss in brief the any four types of surface mining.
- 2) Define sampling, Explain in short the any two geological sampling methods.
- 3) Write the field procedure of seismic method with neat labelled diagram.

**B) Explain the geophysical methods used for groundwater exploration.**

08

**Q.5 Answer the following questions. (Any Two)**

16

- Describe the impact of mining on water resources.
- Explain the field procedure, interpretation and application of gravity method.
- Discuss the geological criterias used for coal prospecting.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Special Paper – XII)**  
**Industrial Microbiology**

Day & Date: Wednesday, 01-02-2023  
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) Rewrite the following sentences by selecting correct answer from given alternatives. 10**

- The waste product of sugar industry is \_\_\_\_\_.  
a) Molasses                      b) Whey  
c) SWL                          d) CSL
- Example of soft cheese is \_\_\_\_\_.  
a) Collage                      b) Swiss  
c) Cheddar                    d) Roquefort
- \_\_\_\_\_ is not used for toxicity testing.  
a) Rabbit                      b) Monkey  
c) Mice                         d) Cat
- Bruce Ames test is used for \_\_\_\_\_ testing.  
a) Sterility                      b) Allergy  
c) Toxicity                      d) Carcinogenicity
- Insulin produced by rDNA technology is used for treating \_\_\_\_\_.  
a) Blood pressure              b) AIDS  
c) Cancer                        d) Diabetes
- \_\_\_\_\_ is used for streptomycin production.  
a) E. coli                        b) B. subtilis  
c) Streptomyces griseus      d) Penicillium
- Addition of hops during beer production gives \_\_\_\_\_ to beer.  
a) Bitterness                    b) Aroma  
c) Flavor                         d) Color
- The buffer used in fermentation media is \_\_\_\_\_.  
a) NaOH                         b) HCl  
c) Calcium carbonate          d) NaCl

- 9)** Cloning organism used for production of rDNA product is \_\_\_\_\_.  
a) Vibrio                                      b) Bacillus  
c) E. coli                                      d) Pseudomonas
- 10)** Red table wine mostly contains \_\_\_\_\_% of alcohol.  
a) 50-60                                      b) 1-2  
c) 10-14                                      d) 20-40

**B) Write proper definition of the following.**

06

- 1) Precursor
- 2) Synthetic media
- 3) Black strap molasses
- 4) Distillation
- 5) Sterility
- 6) Food Spoilage

**Q.2 Solve any Eight of the following.**

16

- 1) Types of wine spoilage
- 2) Antifoaming agent
- 3) Whey
- 4) What is solvent extraction?
- 5) List organisms used in idli production
- 6) Types of wines
- 7) Fruit and vegetable spoilage
- 8) Organisms in curd production
- 9) Flocculation
- 10) Yogurt

**Q.3 A) Attempt any Two of the following.**

10

- 1) Explain food as a substrate.
- 2) Spoilage of milk.
- 3) Write a note on recovery of fermentation product by chromatography.

**B) Write short note.**

06

Write in detail fermentation of cheese.

**Q.4 A) Attempt any Two of the following.**

08

- 1) Pyrogenicity testing.
- 2) Food infection by Salmonella.
- 3) Post fermentation soilage of wine.

**B) Describe idli and bread fermentation.**

08

**Q.5 Answer the following (Any Two).**

16

- Explain vitamin B12 fermentation.
- Explain the principles and methods of food preservation.
- Beer fermentation.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**ELECTRONICS (Special Paper – XII)**  
**Electronics Communication**

Day & Date: Wednesday, 01-02-2023  
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 calculator is allowed.

**Q.1 A) Select the correct alternatives from the Following. 10**

- 1) \_\_\_\_\_ communication is duplex communication system.  
a) Satellite                                      b) Telephone  
c) Wireless                                        d) Television
- 2) In amplitude modulation power in each side band is \_\_\_\_\_ total power.  
a)  $\frac{1}{3}$                                                   b)  $\frac{2}{3}$   
c)  $\frac{1}{6}$                                                   d)  $\frac{4}{3}$
- 3) Virtual height of an ionospheric layer is \_\_\_\_\_ actually penetrates.  
a) More than                                        b) Same as height  
c) Less than                                         d) None
- 4) The band width of TV signal for 625-line scanning is \_\_\_\_\_.  
a) 4.5 MHz                                         b) 5.5 MHz  
c) 10 MHz                                          d) 3 MHz
- 5) In telephone communication impedance matching of all process is achieved by \_\_\_\_\_ circuit.  
a) amplifier                                         b) hybrid  
c) speech                                             d) ringer
- 6) Most commonly noise is introduced in \_\_\_\_\_.  
a) channel                                            b) transmitter  
c) receiver                                            d) destination
- 7) \_\_\_\_\_ is an example of balanced modulator.  
a) Ring modulator                                b) Frequency modulator  
c) Phase modulator                               d) All of these
- 8) One of the following is non resonant antenna \_\_\_\_\_.  
a) Rhombic                                          b) end fire array  
c) folded dipole                                    d) broad side array

- 9) 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
- 10) \_\_\_\_\_ tone indicates that telephone exchange is ready to accept the dialing.
- a) Busy                          b) Ring  
c) Dial                         d) All

**B) Answer in one sentence.**

06

- 1) Define Electronic communication system.
- 2) Define modulation index in A.M. Give its formulae.
- 3) Define radio wave propagation.
- 4) What is super heterodyne principle?
- 5) What is the role of blanking and synch signal?
- 6) Define noise. List its types.

**Q.2 Solve any eight of the following.**

16

- 1) In electronic communication system signal power is 2 watt and noise power is 4 watt calculate signal to noise power in percentage.
- 2) Define skip distance. Give its formulae.
- 3) A 100 MHz carrier is FM modulated by 5 KHz sine wave. If resulting FM signal has frequency deviation of 50 KHz, then calculate modulation index?
- 4) What is radio receiver? What are its types?
- 5) List different tones used in telephone communication.
- 6) What are the types of electronic communication system?
- 7) Give any two differentiating points between AM and FM.
- 8) Draw labeled diagram of Yagi antenna.
- 9) What is audio and video signal?
- 10) List the value-added services used in telephone communication?

**Q.3 A) Attempt any two of the following:**

10

- 1) Explain Electronic communication system with neat block diagram.
- 2) Explain any five receiver characteristics of Radio receiver.
- 3) Derive formulae for power distribution in case of AM.

**B) What is demodulation? Explain Ratio detector as FM discriminator.**

06

**Q.4 A) Attempt any two of the following:**

08

- 1) Explain ground wave radio propagation.
- 2) Explain DTMF dialing system used in telephone communication.
- 3) Explain simplex and duplex communication system.

**B)** Explain Frequency modulation with derivation of output voltage of FM modulated wave.

08

**Q.5 Attempt any two of the following:**

**16**

- a) Explain Monochrome TV receiver with necessary block diagram.
- b) Explain Dish antenna in detail.
- c) Explain telephone communication with necessary block diagram.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Special Paper – XII)**  
**Python**

Day & Date: Wednesday, 01-02-2023  
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) In python block of code can be defined using \_\_\_\_\_ Key.
  - a) curly braces
  - b) round braces
  - c) square braces
  - d) Indentation
- 2) The name of local variables start with an underscore character are used \_\_\_\_\_.
  - a) to identify the variable
  - b) to indicate a private variable of a class
  - c) to indicate special variable
  - d) to indicate the public variable of a class
- 3) What is the output of the following code?

```
x=10
type(x)
```

  - a) <class 'tuple'>
  - b) <class 'int'>
  - c) Type error
  - d) Value Error
- 4) What is the output of the following code?

```
all([5>8, 6>3, 3>1])
```

  - a) True
  - b) False
  - c) 011
  - d) Error
- 5) In function, \_\_\_\_\_ type of arguments doesn't requires to maintain position of arguments.
  - a) Default
  - b) Required
  - c) Keyword
  - d) Variable Length
- 6) To reverse the following list, \_\_\_\_\_ command is used.

```
1st = [10,11,12,13,14,15]
```

  - a) 1<sup>st</sup>[-1:]
  - b) 1<sup>st</sup>[-1::]
  - c) 1<sup>st</sup>[: -1]
  - d) 1<sup>st</sup>[: :-1]



- 7) What is the output of the following code?  
`"ba"+"na"*2`

  - a) banana
  - b) bana2
  - c) ba2na
  - d) error
- 8) The \_\_\_\_\_ is correct way to call base class constructor.

  - a) `base.init()`
  - b) `base()._init_()`
  - c) `super.init()`
  - d) `super()._init_()`
- 9) The \_\_\_\_\_ method is used to read entire file.

  - a) `read()`
  - b) `readline()`
  - c) `readlines()`
  - d) `seek()`
- 10) The Lambda functions are used along with \_\_\_\_\_ built-in functions.

  - a) `any()`
  - b) `insert()`
  - c) `discard()`
  - d) `map()`

**B) Fill in the Blanks.**

06

- 1) \_\_\_\_\_ model is used to find patterns.
- 2) The first parameter for every class method is \_\_\_\_\_.
- 3) The \_\_\_\_\_ function is used to select random element from the given sequence.
- 4) The \_\_\_\_\_ function is used to add new attribute in class.
- 5) The \_\_\_\_\_ exception is raised when a function gets argument of correct type but improper value.
- 6) MRO stands for \_\_\_\_\_.

**Q.2 Answer the followings. (Any Eight):**

16

- 1) What is a nested dictionary? Give example.
- 2) Write down the difference between set and frozen set.
- 3) Write down different string formatters with example.
- 4) What is docstring?
- 5) What are the uses of type and id function?
- 6) What is the use of assert statement? Give example.
- 7) Create any module and use it.
- 8) What are anonymous functions? How to create anonymous functions?
- 9) How to create a constructor and destructor in Python? Give example.
- 10) List all file properties with example.

**Q.3 A) Answer the followings (Any two):**

10

- 1) Create a binary file with 1000 random numbers. Also, write code for reading that file.
- 2) What is an abstract class? Explain with an example.
- 3) Write a regular expression for the password, email, pin code number, and URL validation.

**B)** Why MRO is used? Explain MRO with an example.

06

- Q.4 A) Answer the followings (Any two):** **08**
- 1) Differentiate list and tuples. Explain any four methods of tuples.
  - 2) Explain regular expression's compile method with an example.
  - 3) What are operations with the set? Explain with an example.
- B) What is exception handling? Explain how to create user define exceptions with the creation of any two user-defined exceptions.** **08**
- Q.5 Answer the following (Any Two).** **16**
- a) What is inheritance? Explain all types of inheritance with example.
  - b) What are variable-length arguments? Explain all types with example.
  - c) What is operator overloading? Explain operator overloading and overload any two comparison operators.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**Certificate Course in testing and Repairs of Electric Appliances**  
**(Special Paper-XI)**

Day & Date: Friday, 24-03-2023  
 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 logarithmic table and calculator is allowed.  
 4) Draw neat labelled diagrams wherever necessary.

**Q.1 A) Multiple choice questions.****10**

- 1) For safety purpose \_\_\_\_\_.  
 a) switch is connected on neutral while fuse is connected on live wire.  
 b) switch is connected on live wire and fuse is connected on neutral.  
 c) both switch and fuse are connected on neutral wire.  
 d) both switch and fuse are connected on live wire.
- 2) \_\_\_\_\_ supply is used in domestic installation.  
 a) Single phase                      b) Double phase  
 c) Three phase                      d) D.C.
- 3) A resistor having resistance of 100 ohm carries a current of 10 amperes. How much will be power  $P =$  \_\_\_\_\_.  
 a) 10000 watt                      b) 1000 watt  
 c) 10 watt                      d) 100000 volt
- 4) Standard frequency of commercial a. c. in India is \_\_\_\_\_ Hz.  
 a) 110                      b) 230  
 c) 60                      d) 50
- 5) \_\_\_\_\_ wiring is mainly done in workshops.  
 a) Metal conduit                      b) Concealed  
 c) lead sheathed or CTS                      d) PVC conduit
- 6) A multimeter is used to measure \_\_\_\_\_.  
 a) current                      b) voltage  
 c) resistance                      d) All of these
- 7) An electric doorbell works on the principle of working of \_\_\_\_\_.  
 a) static electricity                      b) Electromagnetism  
 c) magnetomotive force                      d) electromotive force
- 8) Which of the following is not an electric fan?  
 a) Cabin fan                      b) Ceiling fan  
 c) Exhaust fan                      d) weird fan
- 9) Which of the following equipment requires choke and starter to start it?  
 a) incandescent lamp                      b) electric iron  
 c) electric bell                      d) fluorescent tube

- 10) Which of the following is unit of capacitor?
- |          |          |
|----------|----------|
| a) Henry | b) hertz |
| c) Farad | d) ohm   |

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ 06**  
**Give the name/Predict the product etc.**

- 1) A 5-ohm resistance has potential difference of 10 volts across it. The heat produced in 2 seconds will be \_\_\_\_\_ joule.
- 2) Two resistances; 45 ohm and 15 ohms are connected in series; their resultant resistance is \_\_\_\_\_ ohm.
- 3) A 200 ohm resistance is carrying current of 0.5 A. the p. d. across it will be \_\_\_\_\_ volt.
- 4) By oersted experiments it is proved that a current carrying conductor produces \_\_\_\_\_ field around it.
- 5) Mention any two electrical quantities which has same unit?
- 6) Name the electrical quantity which is measured in hertz.

**Q.2 Solve any Eight of the following.** **16**

- What is Earthing of a electrical circuit?
- What is a fuse wire?
- When a fuse melts and why?
- What are different types of earthing?
- A consumer uses two electric bulbs, each of 50 watt, for 5 hours daily. Calculate the units of electricity consumed in two months, assuming that a month is of 30 days.
- Discuss ohms law.
- Distinguish between alternating current and direct current.
- Explain how resultant of two resistances connected in parallel is determined?
- Describe working principle of an electric motor.
- Distinguish between exhaust fan and cabin fan.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Mention any four Electrical safety precautions and explain its meaning.
- 2) With neat circuit diagram discuss working of electric tube.
- 3) With neat diagram explain construction and working of electric fan.

**B)** Average value of voltage measured is 30.3 volt. Calculate maximum value of voltage and R.M. S. value of voltage. **06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) With neat circuit diagram explain working of electric door bell.
- 2) With neat diagram explain construction and working of electric stove.
- 3) With neat diagram explain construction and working of electric toaster.

**B)** Explain joules heating effect of electric current. Illustrate it with suitable example. **08**

**Q.5 Attempt any Two of the following. 16**

- Distinguish between fluorescent tube and incandescent lamp.
- Explain working of starter of fluorescent tube.
- Discuss how a table fan is opened for repairs and how are different parts inspected for repairs.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**Thin Film Deposition and Characterization Techniques (Special paper-XI)**

Day & Date: Friday, 24-03-2023  
 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.  
 4) Draw neat labelled diagrams wherever necessary.

**Q.1 A) Multiple choice questions.****10**

- 1) Thin film is \_\_\_\_\_ dimensional material structure with one degree confinement.
 

|      |      |
|------|------|
| a) 0 | b) 1 |
| c) 2 | d) 3 |
- 2) Thin film deposition techniques are classified into \_\_\_\_\_ types.
 

|      |      |
|------|------|
| a) 2 | b) 3 |
| c) 4 | d) 5 |
- 3) Chemical solution deposition method is also called as \_\_\_\_\_ method.
 

|                              |
|------------------------------|
| a) chemical bath deposition  |
| b) chemical solid deposition |
| c) sol-gel                   |
| d) chemical vapor deposition |
- 4) Generally epitaxial films are grown on \_\_\_\_\_ substrate.
 

|                    |                     |
|--------------------|---------------------|
| a) amorphous       | b) single crystal   |
| c) polycrystalline | d) flexible plastic |
- 5) In SILAR method, thin film formation involves the \_\_\_\_\_ phenomenon during deposition.
 

|                 |             |
|-----------------|-------------|
| a) adsorption   | b) reaction |
| c) both a and b | d) only a   |
- 6) Thin film semiconductor possess \_\_\_\_\_ temperature coefficient.
 

|             |                     |
|-------------|---------------------|
| a) positive | b) zero             |
| c) negative | d) All of the above |
- 7) The gravimetric method is used to determine \_\_\_\_\_ value of the thin film.
 

|                  |                 |
|------------------|-----------------|
| a) contact angle | b) transmission |
| c) absorption    | d) thickness    |
- 8) SI unit of resistance is \_\_\_\_\_.
 

|          |         |
|----------|---------|
| a) watts | b) ohms |
| c) volts | d) amps |
- 9) Scanning electron microscopy help us to see the \_\_\_\_\_ of a sample.
 

|             |                    |
|-------------|--------------------|
| a) molecule | b) atoms           |
| c) inside   | d) surface texture |

- 10)** Minimum interplanar spacing required for Bragg's diffraction is \_\_\_\_.
- a)  $\lambda$                                   b)  $\lambda/4$
- c)  $\lambda/2$                                  d)  $2\lambda$

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ 06**  
**Give the name/Predict the product etc.**

- 1) Which one is standard and most commonly used method for the measurement of electrical resistivity of very high resistivity samples like thin films?
- 2) For measurement in SEM, samples should be electrically \_\_\_\_\_.
- 3) Give the full form of JCPDS.
- 4) Nanomaterials are synthesized by assembling the atoms/molecules together is called \_\_\_\_\_ approach.
- 5) What is the effect of temperature on the energy band gap?
- 6) What is meant by ternary thin films?

**Q.2 Attempt any Eight of the following. 16**

- a) What is thin film deposition?
- b) Write down the disadvantages of chemical methods for thin film preparation.
- c) Draw a schematic labelled diagram of spray pyrolysis unit.
- d) What are the requirements for thin film deposition by silar method?
- e) Why we do annealing of thin films?
- f) What are the materials used for transparent conductive glass substrates?
- g) Write down the Young's equation for contact angle with their usual meaning.
- h) What products have thin films in various sectors?
- i) Write down the general parameters of thin film preparation by chemical methods.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Explain the properties of thin films.
- 2) Explain CBD method for thin film deposition.
- 3) Write a short note on top-down and bottom-up approaches.

**B)** If the wavelength incident on a crystal at a  $38.30^\circ$  angle has a wavelength of  $1.54 \text{ \AA}$ . What is the distance between two layers? **06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) Explain the material properties that are suitable for photovoltaic application.
- 2) Explain the importance of substrate cleaning in thin film preparation and describe the procedure for it.
- 3) What do you mean by energy band gap? Explain difference between direct and indirect band gap?

**B)** For BCC iron, compute 1) the interplanar spacing, and 2) the diffraction angle for the (220) set of planes. The lattice parameter for iron is 0.2866 nm assuming that monochromatic radiation having a wavelength of 0.1790 nm is used, with order of reflection 1. **08**

**Q.5 Attempt any Two of the following. 16**

- Explain sol-gel technique for thin film preparation.
- Explain an experimental procedure for finding the XRD patterns. What information does the XRD pattern of a crystal provide?
- What is the principle of SEM? Explain construction and working of SEM.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**Scientific Research Substrate Cleaning Paper Writing and Publications**  
**(Special Paper-XI)**

Day & Date: Friday, 24-03-2023  
 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) Every research action has a quest of knowledge which is known as \_\_\_\_\_.  
 a) Purpose of research                      b) Object of research  
 c) Result of research                      d) None of the above
- 2) Microsoft Excel 2019 has column limit of \_\_\_\_\_.  
 a) 13684                                      b) 16384  
 c) 18634                                      d) 84163
- 3) In the initial process of research study, literature collected is reviewed and preferably arranged \_\_\_\_\_.  
 a) Alphabetically                      b) Chronologically  
 c) Randomly                              d) None of these
- 4) In Microsoft Excel Workbook can be closed using keyboard shortcut \_\_\_\_\_.  
 a) Ctrl+C                                      b) Ctrl+W  
 c) Esc                                          d) Ctrl+E
- 5) Bibliography is:  
 a) At the end of the study arranged in alphabetical order  
 b) Anywhere in the study  
 c) Beginning of the study  
 d) Not necessary to be included
- 6) One of the useful skills for a researcher is:  
 a) The ability to understand the research  
 b) The ability to write an effective research report  
 c) Both a and b  
 d) None of the above
- 7) Scaling the X and Y axis of graphs plotted in Origin software is \_\_\_\_\_.  
 a) Easy                                          b) Difficult  
 c) Challenging                              d) Impossible
- 8) APA Style, MLA Style, Chicago Manual, Blue Book, OSCOLA are famously known as \_\_\_\_\_.  
 a) Citation Manuals                      b) Directories  
 c) Abbreviation Manuals                      d) Handbooks

- 9) Ethical Neutrality is a feature of \_\_\_\_\_.  
a) Deduction                      b) Scientific method  
c) Observation                    d) Experience
- 10) The Origin software is specifically a \_\_\_\_\_ software.  
a) Photo editing                  b) Table formatting  
c) Report formatting              d) Plotting graph and analysis

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc.**

06

- 1) The graph can be copied from Origin and added in the MS word using \_\_\_\_\_.
- 2) \_\_\_\_\_ is the first step of Research process.
- 3) Population Census is an example of \_\_\_\_\_ type of research.
- 4) \_\_\_\_\_ is a quality of Good Researcher.
- 5) In MS Excel, the content of the cell is shown in \_\_\_\_\_.
- 6) Origin can produce \_\_\_\_\_ graphs.

**Q.2 Solve any Eight of the following.**

16

- a) What is citation index?
- b) What is peer review process for journals? Why it is used?
- c) What is Scopus?
- d) What is scientific writing?
- e) What is the need of scientific words in scientific writing?
- f) How do you prepare index for technical reports?
- g) List the types of charts in MS Excel software.
- h) In which software do you prepare presentations? What are slides in presentation?
- i) What is the advantage of origin over MS Excel?
- j) Name two software's for plotting graph.

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Explain the steps followed to prepare technical reports.
- 2) If you need to add a table in your scientific report, how do you add the table? Write necessary steps to add the table in the report.
- 3) Explain the procedure for peer review of journals for publishing a research paper.

**B)** Write Short note on scientific writing. Give few examples using scientific words.

06

**Q.4 A) Attempt any Two of the following.**

08

- 1) Consider any one electronic device such as pn-junction diode/Zener diode/Transistor and write a technical writing on it.
- 2) Plot the graph of students result analysis in 1<sup>st</sup> class, 2<sup>nd</sup> class, Distinction etc. (Consider 15 students in the class)
- 3) What are the contents of the research paper? Briefly explain each one.

**B)** What is the first step to start research? Explain how one can publish the research article in any journal?

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 scientific writing? Specifically how the first and last slide of the presentation should be prepared?
- b) Explain the steps followed to plot graph using origin. Use minimum 15 rows and 2 columns.
- c) A class of 10 students scored some marks in six subjects. Using MS Excel worksheet list the subject and marks obtained by the students in the given subjects. Use formulae to find total marks, percentage of marks of the class.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**Medical Physics (Special Paper-XI)**

Day & Date: Friday, 24-03-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

**Instructions:** 1) Q. No. 1 and 2 are compulsory.  
 2) Attempt any three questions from Q. No. 3 to Q. No. 7.  
 3) Figures to the right indicate full marks.

**Q.1 A) Choose correct alternative.** **10**

- 1) What is the full form of LASER?
  - a) Light Absorbent and Stimulated Emission of Radiations
  - b) Light Absorbing Solar Energy Resource
  - c) Light Amplification of Stimulated Emission of Radiations
  - d) Light Amplification of Singular Emission of Radiations
- 2) Dental X-Ray is also known as \_\_\_\_\_.
  - a) Orthopedics
  - b) Orthopentology
  - c) Orthology
  - d) Orthopantomography
- 3) What properties of sound wave acts like the principle of ultrasound?
  - a) Reflection and Refraction
  - b) Reflection only
  - c) Refraction only
  - d) Propagation
- 4) When an abdominal ultrasound is done, why is it advised to have a full bladder?
  - a) To have a good acoustic window
  - b) To increase the water content
  - c) To lower impedance
  - d) To allow for better propagation of wave
- 5) Which of the following number system is known as bas-10 system?
  - a) Binary Number System
  - b) Hexadecimal Number System
  - c) Octal Number System
  - d) Decimal Number System
- 6) Which two number form the binary number system?
  - a) 0 and 2
  - b) 1 and 2
  - c) 0 and 1
  - d) 1 and 3
- 7) In how many generations a computer can be classified?
  - a) 3
  - b) 4
  - c) 5
  - d) 6
- 8) What is the difference between soft and hard X-rays?
  - a) Velocity
  - b) Intensity
  - c) Frequency
  - d) Polarization
- 9) In a normal X-Ray machine, X-ray are produced by \_\_\_\_\_.
  - a) bombardment of cathode rays on a radioactive material
  - b) nuclear fission
  - c) nuclear fusion
  - d) super heating of an element

**10)** For which of these areas can the ultrasound be taken for an infant but not for an adult?

- a) Cranium
- b) Chest
- c) Arms
- d) Legs

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product/Write true/false** **06**

- 1) Laser energy is used to break up kidney or gallstones in process called?
- 2) What does MRI Stand for?
- 3) The Geiger Muller counter uses potential difference of \_\_\_\_\_.
- 4) Flame emission detector is a type of radiation detector
  - a) True
  - b) False
- 5) Optic fibers are used in endoscopy.
  - a) True
  - b) False
- 6)  $T_1$  increases with magnetic field.
  - a) True
  - b) False

**Q.2 Answer the following.** **16**

- a) Explain the term electromagnetic wave and Doppler Shift.
- b) What are the features of advantages of PET and X-Ray?
- c) What is electrocardiogram and magnetic resonance?
- d) Discuss visible and IR radiations.

**Q.3 Answer the following.** **16**

- a) Explain the application of Laser in medical field.
- b) Describe ultrasonic waves from piezoelectric materials.

**Q.4 Answer the following.** **16**

- a) Write short notes on sonography.
- b) What are the type of optical radiation? Explain any one of them.

**Q.5 Answer the following.** **16**

- a) Describe about GM tube and its working with the help of diagram
- b) Explain the function of CPU.

**Q.6 Answer the following.** **16**

- a) Describe the x-ray tube and its working with the help of diagram.
- b) Explain the five type of luminescence.

**Q.7 Answer the following.** **16**

- a) Describe contact CT Scan and its working.
- b) What do you mean by medical diagnostic and therapeutic radiation?

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**Energy Resources (Special Paper-XI)**

Day & Date: Friday, 24-03-2023  
 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.

**Q.1 A) Multiple choice questions.**

**10**

- 1) The non-renewable energy resources are \_\_\_\_\_.  
 a) Not pollution-free                      b) Not environment friendly  
 c) Cost is high                                d) All of the above
- 2) Photovoltaic energy is the conversion of sunlight into: \_\_\_\_\_.  
 a) Chemical energy                          b) Biogas  
 c) Electricity                                    d) Geothermal energy
- 3) Horizontal axis and vertical axis are the types of: \_\_\_\_\_.  
 a) Nuclear reactor                          b) Wind mills  
 c) Biogas reactor                              d) Solar cell
- 4) Biomass can be converted to \_\_\_\_\_.  
 a) methane gas                                b) ethanol  
 c) biodiesel                                      d) all of the above
- 5) The difference, in temperature between the core of the planet and its surface, is known as \_\_\_\_\_.  
 a) geothermal coefficient                  b) geothermal gradient  
 c) geothermal constant                      d) none of the above
- 6) Greenhouse effect is due to release of \_\_\_\_\_ gas in atmosphere.  
 a) Carbon monoxide                          b) Carbon dioxide  
 c) Nitrogen                                        d) Hydrogen
- 7) Biogas is used as fuel for \_\_\_\_\_.  
 a) Heating water                                b) Producing electricity  
 c) Cooking food                                 d) Both a and c
- 8) In thermal power plants the fuel used is \_\_\_\_\_.  
 a) Coal                                              b) Oil  
 c) Gas                                                d) All
- 9) In solar cooker \_\_\_\_\_ mirrors are used to focus sunlight.  
 a) Convex                                          b) Biconcave  
 c) Plane                                              d) Concave
- 10) Biogas is a mixture of \_\_\_\_\_.  
 a) Methane and Hydrogen  
 b) Methane and Helium  
 c) Methane and Carbon dioxide  
 d) Methane and Nitrogen

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ 06**

**Give the name/Predict the product etc.**

- 1) What is clarity index?
- 2) Define solar constant.
- 3) What is solar collector?
- 4) Comments "Sun is thermonuclear fusion reactor".
- 5) Define fermentation.
- 6) Define diffuse radiation.

**Q.2 Solve any eight of the following. 16**

- a) List out the applications of solar energy.
- b) What is electrolyte cell?
- c) What is solar cell? What are the uses of solar cell?
- d) Give classification of solar collector.
- e) State various applications of wind energy.
- f) What is OTEC technology?
- g) What is biogas and its disadvantages of using as a fuel?
- h) Define FF and efficiency of solar cell.
- i) What are the constituents of biogas?
- j) What is wind farm?

**Q.3 A) Attempt any two of the following. 10**

- 1) State the advantage and disadvantages of geothermal energy.
- 2) Differentiate between renewable and non-renewable energy resources.
- 3) Give brief description on type of wind turbines.

**B) Short note/solve 06**

Calculate the fill factor and efficiency of a solar cell with dimension 10 cm X 10 cm is illuminated at standard test condition. The cell has the following external parameter:  $V_{oc}=0.8$  V,  $I_{sc}= 3$  A,  $V_{mp}=0.7$  V and  $I_{mp}=2.5$  A.

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

- 1) Explain the construction and working of biogas plant.
- 2) Draw a neat diagram of box type solar cooker.
- 3) List out any four alternative energy resources and state its importance.

**B) Describe/Explain/solve 08**

Draw the line diagram and explain the working of hybrid OTEC cycle.

**Q.5 Attempt any two of the following. 16**

- a) Explain the principle of solar photovoltaic power generation.
- b) Explain the production of biodiesel with a neat flowchart.
- c) Differentiate between 'horizontal axis turbines' and 'vertical axis turbines'.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022  
Geoinformatics (Special paper-XI)**

Day & Date: Friday, 24-03-2023  
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 A) Fill in the blanks. 05**

- 1) Which of the following indicates the correct set of combination in radio waves?
  - a) Shorter wavelength - high frequency
  - b) Longer wavelength - less frequency
  - c) Shorter wavelength - less frequency
  - d) Longer wavelength - high frequency
- 2) Outcrop of limestone in vector format can be represented by \_\_\_\_\_.
  - a) Point
  - b) Line
  - c) Polygon
  - d) All of these
- 3) In false colour composite (FCC) image healthy vegetation appears:
  - a) Blue
  - b) Red
  - c) Green
  - d) Orange
- 4) Solapur falls in which zone of UTM?
  - a) 43W
  - b) 43S
  - c) 43E
  - d) 43N
- 5) A conical shaped feature with central depression and which stand out from the surrounding area in the aerial photographs suggest presence of \_\_\_\_\_.
  - a) anticlinal hill
  - b) Dome
  - c) volcanic cone with crater
  - d) None of the above

**B) Answer the following questions in one sentence. 03**

- 1) What are three basic elements of vector data?
- 2) What is diffuse reflection?
- 3) What band combination occurs in FCC?

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

- a) How do you recognise shallow and deep water in aerial photographs?
- b) How dyke is represented in the aerial photograph?
- c) Give examples of spatial and non-spatial data.
- d) What is difference between Nadir and Principal point?
- 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) What are various scales of aerial photographs?

**B) Explain any one type of resolution of digital imagery. 03**

**Q.4 Attempt any Two of the following.**

**08**

- a) What are various errors in flying?
- b) Describe various platforms of remote sensing
- c) What is spectral reflectance curve?

**Q.5 Attempt any One of the following.**

**08**

- a) Describe in brief various elements of photointerpretation.
- b) Describe classification of aerial photograph based on camera axis.
- c) Describe basic components of remote sensing.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Friday, 24-03-2023  
Time: 03:00 PM To 06:00 PM

**Instructions:**

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

## 10

- Which of the following symbols represent redirection?  
a) -                                      b) <  
c) &                                        d) |
- The statement `z='expr 5 / 2'` would store which of the following values in z?  
a) 0                                        b) 1  
c) 2                                        d) 5
- Which of the following command is used to access an SMB share on a Linux system?  
a) NFS                                     b) smbclient  
c) SMD                                    d) smbserver
- Which is the correct way to use the nice command?  
a) nice 5 class                          b) nice +5 class  
c) nice -d class                         d) none of these
- What is the full path for grub's configuration file?  
a) /boot/grub/lsof.conf                b) /boot/grub/menu.lst  
c) /etc/grub/grub.conf                d) /etc/grub/grub.txt
- Which can be used to find a file emp.sh under the current directory or its subdirectories?  
a) find . -print emp.sh                b) find emp.sh  
c) find . emp.sh                         d) none of these
- Which command used to print the route packets trace to a network host?  
a) netstat                                b) route  
c) routetrace                            d) none of these
- Which can be used to show the content of a zip file without extracting a file?  
a) unzip -t                                b) unzip -d  
c) unzip -Z                                d) unzip -x
- Which symbol is used to separate more than one command in the command line?  
a) \$                                        b) #  
c) :                                        d) ;



**10)** You need to change some settings on your Apache server. Which is the best tool to use for logging in remotely?

- a) rsh
- b) ssh
- c) rlogin
- d) telnet

**B) Fill in the blanks.**

**06**

- 1) \_\_\_\_\_ system variable is used to store the PID of the current shell.
- 2) Case statement ends with \_\_\_\_\_.
- 3) The location for subdirectories for local programs and executable for user and administrative commands is in \_\_\_\_\_ directories.
- 4) “?” Wild character is used for matching \_\_\_\_\_ character.
- 5) When you in the vi editor, by default you are in \_\_\_\_\_ mode.
- 6) \_\_\_\_\_ is used to replace a single character in “vi” editor.

**Q.2 Solve any Eight of the following.**

**16**

- a) Define File permission?
- b) What is Linux and why is it so popular?
- c) List the name of different Shells available in Linux.
- d) What is shell script?
- e) What is chown command with example?
- f) Define Inode Block.
- g) What are positional parameters?
- h) How do we move jobs to background and foreground?
- i) Define we command.
- j) What are the network / communication commands?

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) How to create archive file in Linux with example?
- 2) Explain different boot loaders.
- 3) What is the syntax for different types of loops available in shell scripting with example?

**B) Write a shell script to check entered number is Armstrong or not.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) How files are internally organized in Linux file system? Explain it briefly.
- 2) What is a shell? How does it work with the kernel & user?
- 3) What is the difference between hard and soft links?

**B) Write a menu driven shell Script**

**08**

- 1) Copy a file
- 2) Remove a file
- 3) Move a directories
- 4) Cut fields 1,3,5 from bca file
- 5) To remove repeated data from bcom file.

**Q.5 Attempt any Two of the following.**

**16**

- a) Explain Input mode in detail.
- b) Describe the use of filter. Explain sort filter command in detail.
- c) Explain sed command in detail with example.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2022**  
**MS-EXCEL (Special paper-XI)**

Day & Date: Friday, 24-03-2023  
 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) Choice the correct alternative.**

**10**

- 1) Excel is a program that is used to prepare a \_\_\_\_\_.  
 a) Slide presentation                      b) Spreadsheet  
 c) Text document                              d) Database
- 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) \_\_\_\_\_ is a powerful tool used to create and format spreadsheets?  
 a) Adobe Photoshop CS                      b) Mozilla Firefox  
 c) Microsoft Office Power Point              d) Microsoft Office Excel
- 7) Workbook is a collection of \_\_\_\_\_.  
 a) Worksheet                                      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) Pre- defined and built in formulas in Excel are known as \_\_\_\_\_.  
 a) Auto sheets                                      b) Charts  
 c) Functions                                          d) Tables

**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) What do you mean by cells in an Excel sheet?
- b) Explain what is a spreadsheet?
- c) What are charts in MS-Excel?
- d) Write the function for calculating p.m.f. of Poisson distribution with  $\lambda = 2$ .
- 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 generate random 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 10, add 5 in the result, and divide it by 2.

**B) Write short notes on 'Data' tab 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) What is difference between a function and a formula in Excel?
- 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.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**ENGLISH (Compulsory)**  
**Literary Mindscapes – I**

Day & Date: Tuesday, 28-03-2023  
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 Rewrite the following sentences by choosing the correct alternative. 08**

- 1) In the story ‘Growing up’ the name of Robert’s dog is \_\_\_\_\_.  
a) Sport                                      b) Sort  
c) Short                                        d) Snore
- 2) Aksionov’s wife see in her dream about him that \_\_\_\_\_.  
a) he lost his hair                          b) his hair had become grey  
c) he became ill                             d) he got arrested
- 3) In the poem “Sita” \_\_\_\_\_ children are listening to the story.  
a) two                                          b) three  
c) four                                         d) five
- 4) Who is the painter of the duchess’s portrait?  
a) Aphra Pandolf                          b) Fra Pangol  
c) Aphra Behn                               d) Fra Pandolf
- 5) In the poem “Ode to Beauty” \_\_\_\_\_ are read or heard by us.  
a) Plays and classical music              b) Novels and songs  
c) Lovely tales                                d) Poetry and western music
- 6) In the poem “Life” \_\_\_\_\_ springs again like elastic.  
a) Tragedy                                    b) Family  
c) Hope                                         d) Death
- 7) He went \_\_\_\_\_ to his office to look for his lost keys. (Choose the correct adverb)  
a) Back                                         b) Backside  
c) Back in                                      d) Back up
- 8) The helping verb always comes after the \_\_\_\_\_ in indirect form.  
a) Object                                        b) Complement  
c) Subject                                       d) Adverbial

**Q.2 Write answer in short. (Any Four) 12**

- Why did Robert Quick not ask for the children's affection?
- Why did Aksionov leave the inn early?
- Why was the forest so dark and dense in the poem "Sita"?
- Describe the personality of the Duchess.
- Describe John Keat's philosophy of Beauty.
- What did Charlotte Bronte say about life in the poem "Life"?

- Q.3 Answer the following questions. (Any One) 10**
- a)** What is an Information Literacy? Explain the benefits of Information Literacy?
- OR**
- b)** Write a note on Leadership skill with its characteristics.
- Q.4 What is Environment consciousness skill? Mention habits for environment conservation. 10**

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper- XIV)**  
**Electrodynamics**

Day & Date: Monday, 27-03-2023  
 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 tables and calculator is allowed.

**Q.1 A) Multiple choice questions.****10**

- 1) Which of the following statement is wrong?
  - a) charged particle at rest in an electric field experience force due to the field.
  - b) A moving charged particle in an electric field experience force due to the field.
  - c) A charged particle at rest in the magnetic field experience force due to the field.
  - d) A moving charged particle in the magnetic field experience force due to the field.
- 2) A uniform electric field is applied along positive Y direction. A moving charged particle enters the electric field along positive X direction. If x is the distance travelled by the particle in X direction, then the particle's deflection along Y direction (y) is proportional to \_\_\_\_\_.
 

|          |          |
|----------|----------|
| a) x     | b) $x^2$ |
| c) $x^3$ | d) $x^4$ |
- 3) Generation of motional emf is the principle of \_\_\_\_\_.
 

|                      |                 |
|----------------------|-----------------|
| a) battery           | b) generator    |
| c) photovoltaic cell | d) voltaic cell |
- 4) According to Lenz's law, the induced e. m. f. \_\_\_\_\_ the rate of change of magnetic flux.
 

|                    |              |
|--------------------|--------------|
| a) does not oppose | b) opposes   |
| c) increases       | d) decreases |
- 5) Mathematical formulation of empirical laws in electricity and magnetism are known as \_\_\_\_\_.
 

|                        |                        |
|------------------------|------------------------|
| a) Maxwell's equations | b) Faraday's equations |
| c) Lorentz's equations | d) Laplace's equations |
- 6) In vacuum, polarization and magnetization are \_\_\_\_\_.
 

|                          |                           |
|--------------------------|---------------------------|
| a) absent                | b) present                |
| c) of variable magnitude | d) of different magnitude |
- 7) In electromagnetic fields \_\_\_\_\_ is conserved.
  - a) total energy
  - b) total momentum
  - c) both energy and momentum
  - d) neither energy nor momentum

- 8) The nature of electromagnetic waves is \_\_\_\_\_.  
 a) Longitudinal  
 b) Stationary  
 c) Transverse  
 d) Neither transverse nor longitudinal
- 9) A light ray travelling from denser (glass) to rarer medium (air) at an angle of incidence more than critical angle for the pair of media, suffers \_\_\_\_\_.  
 a) scattering  
 b) interference  
 c) Diffraction  
 d) Total internal reflection
- 10) Static charge can \_\_\_\_\_.  
 a) radiate  
 b) not radiate  
 c) nothing can be said  
 d) radiate at some condition

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**

- 1) The trajectory of a charged particle in mutually perpendicular crossed electric and magnetic fields is \_\_\_\_\_.
- 2) Both Self-inductance and mutual inductance are measured - in the unit \_\_\_\_\_.
- 3) The statement 'magnetic free poles do not exist.' is justified by Maxwell's equation \_\_\_\_\_.
- 4) The cross product  $\vec{E} \times \vec{H}$  gives \_\_\_\_\_ vector.
- 5) The sum of reflection and transmission coefficients,  $R+T =$  \_\_\_\_\_.
- 6) Total power radiated by electric dipole is proportional to \_\_\_\_\_ power of frequency.

**Q.2 Solve any Eight of the following. 16**

- a) Write Gauss law in differential form and give meaning of each term.  
 b) Explain in brief electromotive force.  
 c) State Biot-Savart's law.  
 d) State Poynting's theorem.  
 e) Define skin depth.  
 f) Define reflection coefficient of electromagnetic wave.  
 g) If refractive index of glass and air are respectively 1.5 and 1. Calculate the value of Transmission coefficient (T) of the glass-air interface.  
 h) Light emitted by the sun travels with speed of  $3 \times 10^8 \text{ m/s}$  and reaches the earth. Distance between sun and earth is  $150 \times 10^9 \text{ m}$ . Calculate retarded time ( $t_r$ ) if current time ( $t$ ) is 6 A.M.  
 i) What is retarded potential?  
 j) With neat diagram explain an electric dipole.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Discuss the motion of a charged particle in constant, uniform electric field.  
 2) Explain Faraday's law of electromagnetic induction.  
 3) Write a note on Biot-Savart's law.

**B) For sea water;  $\sigma = 4.2 \text{ mho/m}$  at a frequency of 50 kHz. Calculate the skin depth. Given: permeability of medium;  $\mu = \mu_0 = 4\pi \times 10^{-7} \text{ H/m}$ . 06**

- Q.4 A) Attempt any Two of the following. 08**
- 1) Considering Maxwell's equations in vacuum, find out wave equations for electric and magnetic fields. Obtain expression for velocity of EM waves in vacuum.
  - 2) Obtain the boundary condition for electromagnetic field vectors  $\vec{D}$ ,  $\vec{E}$ ,  $\vec{B}$  and  $\vec{H}$  at the interface of two media.
  - 3) What is radiation reaction? Deduce an expression for radiation reaction force for an electric dipole.
- B) State Maxwell's equations for vacuum and explain the physical significance of each equation. 08**
- Q.5 Attempt any Two of the following. 16**
- a) Explain the motion of charged particle in crossed, uniform and constant Electric ( $\vec{E}$ ) and Magnetic ( $\vec{B}$ ) fields.
  - b) What is transformer? Obtain the relation  $\frac{\epsilon_2}{\epsilon_1} = \frac{N_2}{N_1}$
  - c) Write a note on total internal reflection. Calculate value of critical angle for the pair of media having refractive indices 1.414 and 1.



**Seat  
No.**

Day & Date: Monday, 27-03-2023  
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 labeled diagrams wherever necessary.
- 4) Use of log table and calculators is allowed.

**Q.1 A) Fill in the blanks by choosing most correct alternative among those given below and rewrite the sentences.** **10**

- 1) Vibrational spectra of diatomic molecule observed in \_\_\_\_\_ region.  
a) Visible                      b) Near infrared  
c) Microwave                  d) X-ray
- 2) As wave length of radiation is increased, the energy of that radiation is \_\_\_\_\_.  
a) increases                    b) decreases  
c) remains same                d) none of these
- 3) The solution of lower vapour pressure will boil at \_\_\_\_\_.  
a) Higher temperature        b) Lower temperature  
c) Higher vapour pressure     d) None of these
- 4) The liquid mixture which boil at constant temperature without change in its composition is called \_\_\_\_\_ mixture.  
a) zeotropic                    b) fractional  
c) boiling                        d) azeotropic
- 5) At constant pressure  $dG = vdP - sdT$ , then  $\left(\frac{dG}{dT}\right)_P = \text{\_\_\_\_}$ .  
a) S                                b) V  
c) –S                              d) – p
- 6) Work function A is defined as \_\_\_\_\_.  
a)  $A = E + TS$                     b)  $A = H - TS$   
c)  $A = E - TS$                     d)  $A = G + TS$
- 7) The variation of melting point of solid with pressure is given by \_\_\_\_\_ equation.  
a) Clapeyron – Clausius        b) Arrhenius  
c) Kirchhof's                      d) Gibb's
- 8) In a reaction,  $2A + B \rightarrow C + D$ , the molecularity of the reaction is \_\_\_\_\_.  
a) 2                                b) 0  
c) 3                                d) 1
- 9) An increase in temperature, temperature coefficient of reaction \_\_\_\_\_.  
a) increases                      b) decreases  
c) remains constant              d) none of these
- 10) The reaction having smaller energy of activation are \_\_\_\_\_.  
a) Fast                              b) Slow  
c) Steady                          d) Both (a) & (b)

- B) Fill in the blanks:** **06**
- 1) Reactions which proceeds in a series of successive stages initiated by suitable primary processes are called as \_\_\_\_\_.
  - 2) The selection rule for rotational spectra is \_\_\_\_\_.
  - 3) The term fugacity has the dimension of \_\_\_\_\_.
  - 4) At equilibrium free energy change is \_\_\_\_\_.
  - 5) The temperature at which the total vapour pressure of solution becomes equal to atmospheric pressure is known as \_\_\_\_\_.
  - 6) The distance between two nearest troughs or crests is known as \_\_\_\_\_.

**Q.2 Solve any Eight of the following.** **16**

- 1) State Raoult's law.
- 2) Define critical solution temperature.
- 3) What is mean by Rayleigh scattering?
- 4) Define the terms fugacity and activity.
- 5) Give the applications of rotational spectra.
- 6) Define opposing and parallel reactions.
- 7) Mention the applications of Clausius - Clapeyron equation.
- 8) Show that half life period of third order reaction is inversely proportional to the square of the initial concentration of reactants.
- 9) Define : a) frequency                      b) wave number
- 10) For a third order reaction, when  $\frac{1}{(a-x)^2}$  are plotted against time t, draw the nature of graph and find its slope.

**Q.3 A) Attempt any Two of the following:** **10**

- 1) Discuss the fractional distillation of solutions of liquids in liquids with minimum boiling point.
- 2) Write a note an chain reactions.
- 3) Derive Gibbs - Helmholtz equation.

- B)** Calculate the reduced mass and moment of inertia of CO, if the bond length is 1.134 Å and atomic masses are C = 12 and O = 15.995. **06**  
*Given :  $N = 6.024 \times 10^{23}$*

**Q.4 A) Attempt any Two of the following:** **08**

- 1) Distinguish ideal and non - ideal solutions.
- 2) Draw the Vibrational energy level diagram. Explain Vibrational spectra in detail.
- 3) What is Arrhenius equation? How it is used to determine the value of energy of activation?

- B)** The equilibrium constant  $K_p$  for a reaction at 373K is 0.06 and at 403K, it is 0.5953. Calculate the enthalpy change. (Given =  $8.314 \text{ JK}^{-1}\text{mole}^{-1}$ ) **08**

**Q.5 Attempt any Two of the following:** **16**

- a) Derive Clapeyron - Clausius equation.
- b) Describe mutual solubility of partially miscible liquids with maximum critical solution temperature.
- c) Derive the rate equation of third order reaction. Give any two examples.

10/10/2014

## Max. Marks: 80

10

- Page 1 of 2

- 10) The fungi, causing powdery mildews, are \_\_\_\_\_.  
 a) Obligate parasites                      b) Facultative parasites  
 c) Obligate saprophytes                  d) Facultative saprophytes.

**B) One sentence answer.**

**06**

- 1) Define host.
- 2) Give the name of any two fungal diseases.
- 3) Give the name of two viral diseases.
- 4) Define parasite.
- 5) What is symptoms
- 6) What is Aerobiology

**Q.2 Solve any Eight of the following.**

**16**

- a) Write symptoms of tikka disease of ground nut.
- b) Cultural control of plant disease.
- c) Biological control plant diseases.
- d) Write causal organisms of Powdery mildew of Mango and White rust of crucifer.
- e) Write control measures for Citrus canker.
- f) What is seed pathology? Give the examples of seed pathogen.
- g) What is seed certification?
- h) Explain the role of aerobiology in disease forecasting.
- i) Write symptoms of Bacterial blight of pomegranate.
- j) Write symptoms on Powdery mildew of Mango.

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Describe the classification of plant diseases based on symptoms, spread and severity of infection.
- 2) Describe Red rot of sugarcane with respect to causal organism, symptoms and control measures.
- 3) Describe Yellow vein mosaic of Bhendi with respect to causal organism, symptoms and control measures.

**B) Write importance of plant diseases.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) Give an account of Late blight of potato with respect to causal organism, symptoms and control measures.
- 2) What is rust? Explain the brown rust of wheat with respect to causal organism, symptoms and control measures.
- 3) Explain scope and importance of aerobiology.

**B) What is seed treatment? Explain the different methods used in seed treatment.**

**08**

**Q.5 Attempt any Two of the following.**

**16**

- a) Explain Grain smut of Jowar with respect to causal organism, symptoms and control measures.
- b) Define following terms: 1) Pathogen 2) Pathogenicity 3) Pathogenesis 4) Incubation period 5) Hypersensitivity 6) Infection 7) Immunity 8) Resistance.
- c) Explain Wilt of Pigeon pea with respect to causal organism, symptoms and control measures.

**Seat  
No.**

Max. Marks: 80

- 1) The rhythmic contraction and relaxation of heart is known as \_\_\_\_\_.  
a) Heat valve                      b) Heart beat  
c) Heart attack                  d) Heart burn
- 2) The colour of Human blood is red due to the respiratory pigment \_\_\_\_\_.  
a) Haemoglobin                  b) Haemocyanin  
c) Chlorocrorin                d) Pinnaglobin
- 3) \_\_\_\_\_ is defined as gaseous exchange between the organism and environment.  
a) Digestion                      b) circulation  
c) Excretion                     d) Respiration
- 4) The breakdown of complex food into simpler form is called \_\_\_\_\_.  
a) Digestion                      b) Respiration  
c) Circulation                   d) Excretion
- 5) The animals excreting ammonia are called \_\_\_\_\_.  
a) Ureotelic                      b) Uricotelic  
c) Hydrotelic                    d) Amonotelic
- 6) ABO system of blood grouping was discovered by \_\_\_\_\_.  
a) Carl Linnneous                b) Carl Landsteiner  
c) Karl Max                      d) Carl Lewis
- 7) \_\_\_\_\_ is the major organ to produce new RBC.  
a) Heart                          b) Brain  
c) Bone                          d) Lung
- 8) In myogenic heart beat originates in the \_\_\_\_\_.  
a) Muscle                        b) Bone  
c) Nerve                         d) Blood
- 9) Stress management is about learning \_\_\_\_\_.  
a) How to avoid the pressures of life  
b) How to develop skills that would enhance our body's adjustment when we are subjected to the pressures of life  
c) Both a and b  
d) None
- 10) Major stress hormone is \_\_\_\_\_.  
a) Adrenaline                      b) Glucagon  
c) Epinephrine                  d) Cortisol

- B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the Name/Predict the product etc. 06**
- 1) \_\_\_\_\_ blood group is the Universal acceptor.
  - 2) Define: Pulmonary respiration.
  - 3) What is gastric digestion?
  - 4) Name the instrument used to measure electrical impulse of heart.
  - 5) Name the instrument used to treat the patients with acute renal failure.
  - 6) What is the end product of protein digestion?

- Q.2 Answer any Eight of the following 16**
- a) What is blood pressure? How is it measured?
  - b) What is Tidal Volume?
  - c) What are respiratory pigments? Name any 2
  - d) What is micturation?
  - e) Name the hormones which control the gastrointestinal tract.
  - f) Name 2 bile salts.
  - g) Give the different types WBC in blood.
  - h) Write the function of kidney.
  - i) What is Tachycardia?
  - j) Name any 2 enzymes of pancreas.

- Q.3 A) Attempt any Two of the following. 10**
- 1) Describe origin and conduction of heart beat.
  - 2) Internal respiration
  - 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) Chloride shift
  - 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 intestinal digestion.
  - c) Describe the process of urine formation.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Special Paper – XIII)**  
**Metric Spaces**

Day & Date: Monday, 27-03-2023  
 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 alternative for each of the following.** **10**

- 1) Which of the following sequence is element of  $l^2$  space?
  - a)  $\left\{ \frac{1}{\sqrt{n}} \right\}_{n=1}^{\infty}$
  - b)  $\left\{ \frac{1}{n} \right\}$
  - c) Both a) and b)
  - d) Neither a) nor b)
- 2) If  $f: J \rightarrow \mathbb{R}$  where  $J \subseteq \mathbb{R}$ , if  $f$  is non decreasing on  $J$  then  $f$  is strictly increasing if and only if.
  - a)  $f$  is invertible
  - b)  $f$  is onto
  - c)  $f$  is one - one
  - d)  $f$  is both one - one and onto
- 3) If  $f$  is monotone function on  $(a, b)$  and if  $c \in (a, b)$  then
  - a)  $\lim_{x \rightarrow c^-} f(x)$  exist
  - b)  $\lim_{x \rightarrow c^+} f(x)$  exist
  - c) Neither a) nor b)
  - d) Both a) and b)
- 4) Which of the following is not continuous function of  $\mathbb{R}'$ 
  - a)  $f(x) = \frac{\sin x}{x}$
  - b)  $g(x) = \frac{1+x^3}{1+x}$
  - c)  $f(x) = x$
  - d)  $f(x) = x^n$
- 5) Let  $M = [0,1]$  with absolute value metric then which of the following is incorrect?
  - a)  $B\left[\frac{1}{4}, \frac{1}{4}\right] = \left(0, \frac{1}{2}\right)$
  - b)  $B\left[\frac{1}{4}, \frac{1}{2}\right] = \left(0, \frac{3}{4}\right)$
  - c)  $B\left[\frac{1}{2}, \frac{1}{2}\right] = (0,1)$
  - d)  $B\left[\frac{1}{2}, \frac{1}{4}\right] = \left(\frac{1}{4}, \frac{3}{4}\right)$
- 6) Which of the following is correct statement?
  - a) The intersection of infinite number of open set is open set
  - b) The union of infinite number of closed set is closed set
  - c) The intersection of infinite number of closed set is closed set
  - d) The union of infinite number of open sets need not be open set
- 7) If  $A$  and  $B$  are closed subsets of  $\mathbb{R}$ , then
  - a)  $A \times B$  is open subset of  $\mathbb{R}$
  - b)  $A \times B$  is closed subset of  $\mathbb{R}$
  - c)  $A \times B$  is open subset of  $\mathbb{R}^2$
  - d)  $A \times B$  is closed subset of  $\mathbb{R}^2$
- 8) I) The interval  $(0, \infty)$  is bounded subset of  $\mathbb{R}'$   
 II) The interval  $(0, \infty)$  is bounded subset of  $\mathcal{R}_d$ 
  - a) Only I is correct
  - b) Only II is correct
  - c) Both I & II are correct
  - d) Both I & II are incorrect

- 9) Which of the following is incorrect statement?
- If  $f(x) = x^2, (-1 \leq x \leq 1)$  then  $f$  attains maximum value at  $x = 1$  and  $x = -1$
  - If  $f(x) = x^3, (-\infty < x < \infty)$  then  $f$  attains maximum and minimum value
  - If  $f(x) = x^2, x \in [0, 2]$  be real valued function then  $f$  attains minimum value at the point  $x = 0$
  - All of these
- 10) A metric space  $\mathbb{R}^1$  is not compact because
- It is complete but not totally bounded
  - It is totally bounded but not complete
  - It is neither totally bounded nor complete
  - All of these

**B) Attempt the following questions.****06**

- Define the norm for the sequence in  $\ell^2$  space.
- Define Cauchy sequence in metric space.
- Define Homeomorphism.
- Define limit point of subset of metric space.
- State finite intersection property.
- Define  $\epsilon$ -dense subset of metric space.

**Q.2 Attempt any eight of the following.****16**

- Show that  $\varrho: \mathbb{R} \times \mathbb{R} \rightarrow \mathbb{R}$  defined by  $\varrho(x, y) = |x - y|$  is metric on  $\mathbb{R}$ .
- Let  $(M, \varrho)$  be a metric space then show that every convergent sequence of points in  $M$  converges to unique limit.
- Prove that the usual metric for  $\mathbb{R}^2$  and the metric  $\sigma$  defined by  $\sigma(P, Q) = |x_1 - x_2| + |y_1 - y_2|$  where  $P(x_1, y_1), Q(x_2, y_2) \in \mathbb{R}^2$  are equivalent.
- Prove that if  $f$  is continuous at  $a \in \mathbb{R}'$  then  $|f|$  is also continuous at  $a \in \mathbb{R}'$
- If  $R_d$  is discrete metric space then find  $B[a, 1]$  and  $B[a, 2]$  for any  $a \in R_d$
- In any metric space  $(M, \varrho)$  show that the sets  $M$  and  $\phi$  are closed sets.
- Show that the closed subset of complete metric space is complete.
- If  $f(x) = \frac{1}{1+x}, (-\infty < x < \infty)$ , then prove that  $f$  attains maximum value but does not attain a minimum value.
- If  $u = \{u_n\} \in \ell^2$  and let  $T_u = \left\{\frac{u_n}{2}\right\}_{n=1}^{\infty}$  then show that  $T$  is contraction of  $\ell^2$ .
- Define Heine - Borel property in a metric space.

**Q.3 A) Attempt any two of the following.****10**

- Let  $x = \{x_n\}_{n=1}^{\infty}$  and  $y = \{y_n\}_{n=1}^{\infty}$  are in  $\ell^2$  and  $\varrho(x, y) = \|x - y\|_2$  then show that  $(\ell^2, \varrho)$  is metric space.
- Prove that if  $F_1$  and  $F_2$  are closed in metric space  $M$  then  $F_1 \cup F_2$  is also closed in  $M$ .
- If the metric space  $M$  has Heine - Borel property then prove that  $M$  is compact.

**B) State and prove Schwarz inequality in  $\ell^2$  space.****06**



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

- 1) Let  $(M, \rho)$  be a metric space and  $a \in M$ . If  $f$  and  $g$  are real valued function such that  $\lim_{x \rightarrow a} f(x) = L$  and  $\lim_{x \rightarrow a} g(x) = N$  then prove that  

$$\lim_{x \rightarrow a} (f(x) + g(x)) = L + N \text{ and } \lim_{x \rightarrow a} (f(x) \cdot g(x)) = L \cdot N$$
- 2) Prove that the characteristics function of rational number is not continuous in  $\mathbb{R}'$
- 3) If  $f$  is a continuous function from the compact metric space  $M_1$  in to the metric space  $M_2$  then prove that the range  $f(M_1)$  is also compact.

**B) State and prove fixed point theorem.****08****Q.5 Answer the following questions. (Any two)****16**

- 1) Define metric space and prove that the set  $\mathbb{R}^n$  is metric space with metric

$$\text{defined as } \rho(x, y) = \left[ \sum_{i=1}^n (x_i - y_i)^2 \right]^{\frac{1}{2}}$$

where  $x = (x_1, x_2, \dots, x_n)$ ,  $y = (y_1, y_2, \dots, y_n) \in \mathbb{R}^n$

- 2) Define open set and prove that if  $G_1$  and  $G_2$  are open in metric space  $M$  then  $G_1 \cap G_2$  is also open. Also prove or disprove that arbitrary intersection of open set is open.
- 3) Let  $(M, \rho)$  be a metric space prove that a subset  $A$  of  $M$  is totally bounded if and only if every sequence of points in  $A$  contains a Cauchy subsequence.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper-XIII)**  
**Statistical Inference–II**

Day & Date: Monday, 27-03-2023  
 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 tables and calculator is allowed.

**Q.1 A) Choose the correct alternative** **10**

- 1) Level of significance is the probability of
  - a) Type I error
  - b) Type II error
  - c) Both (a) and (b)
  - d) Cannot be determined
- 2) Critical region provides us the criteria for \_\_\_\_\_ of the null hypothesis
  - a) Acceptance
  - b) Rejection
  - c) No decision
  - d) None of these
- 3) In a random variable  $X$  has  $N(\mu, \sigma^2)$  where  $\sigma^2$  is known, Then which of the following is a simple hypothesis?
  - a)  $\mu = 0$
  - b)  $\mu < 0$
  - c)  $\mu > 0$
  - d)  $\mu \neq 0$
- 4) The choice of one tailed or two tailed test depends on
  - a) Null hypothesis
  - b) Alternative hypothesis
  - c) Both a) and b)
  - d) None of these
- 5) Pivotal quantity used for constructing confidence interval for parameter  $\sigma^2$  in case of  $N(\mu, \sigma^2)$  distribution ( $\mu$  is known) follows.
  - a) Chi square distribution with  $(n - 1) df$
  - b)  $t$  distribution with  $n df$
  - c) Chi square distribution with  $n df$
  - d)  $F$  distribution.
- 6) In SPRT, decision about the hypothesis is taken
  - a) After each successive observation
  - b) After a fixed number of observations
  - c) At least after five observations
  - d) When the experiment is over.
- 7) Ordinary sign test Utilizes
  - a) Poisson distribution
  - b) Binomial distribution
  - c) Normal distribution
  - d) None of the above
- 8) If there are 10 symbols of two types of equal in number, the maximum possible number of runs is
  - a) 8
  - b) 9
  - c) 10
  - d) None of the above
- 9) Neyman – Pearson lemma provides.
  - a) Confidence interval
  - b) Most powerful test
  - c) Goodness of fit test
  - d) None of the above

- 10) Randomness of a sequence through run test is decided by comparing the observed number of runs with
- Z value
  - T value
  - Two critical values
  - None of the above

**B) Solve the following**

**06**

- LRT for equality of two population variances of normal distribution reduces to \_\_\_\_\_ test.
- Range of likelihood ratio test statistic is \_\_\_\_\_.
- State True or False: if the length of confidence interval is zero, it gives point estimate.
- Find 95% confidence interval for  $\mu$  if random sample of size 64, is drawn from  $N(\mu, 4)$  with sample mean = 3.
- Hypothesis which specifies the population distribution is known as \_\_\_\_\_.
- Define "run" of nonparametric tests.

**Q.2 Solve any eight of the following.**

**16**

- Explain the term "Pivotal quantity".
- Define simple and composite hypothesis.
- Define probabilities of type - I and Type - II errors.
- Explain the use of Likelihood Ratio Test (LRT).
- What are the assumptions of non parametric tests?
- What are the critical values of SPRT tests?
- What is the test statistics for Wilcoxon's signed-Rank test?
- Define most powerful test.
- Define best critical region.
- How Kolmogorov Smirnov test is compared with chi-square test?

**Q.3 A) Solve any two of the following.**

**10**

- Obtain  $100(1 - \alpha)\%$  confidence interval for the population mean  $\mu$ , when random sample of size  $n$  is drawn from  $N(\mu, \sigma^2)$  when  $\sigma^2$  is unknown.
- Based on a random sample of size  $n$  from  $f(x, \theta) = \theta x^{\theta-1}$   $0 < x < 1$  show that the best critical region (BCR) for testing  $H_0: \theta = 1$  against

$$H_1: \theta = 2 \text{ is } \prod_{i=1}^n x_i \geq C$$

- Explain Mann – Whitney U test

- B)** A sample of size one from exponential distribution is drawn to test the hypothesis  $H_0: \theta = 2$  against  $H_1: \theta = 1$ . The hypothesis  $H_0$  is rejected if the observed value is greater than or equal to one. Find the probabilities of Type - I and Type - II errors.

**06**

**Q.4 A) Solve any two of the following**

**08**

- Let  $X_1, X_2 \sim N(\mu, 1)$   $X_1, X_2$  are independent. Define  $T = \sqrt{2} \left( \frac{X_1 + X_2}{2} - \mu \right)$  is T a pivotal quantity.
- Explain in short the sign test for paired sample.
- Let X be a Bernoulli Variate with pmf  $P(x, \theta) = \theta^x (1 - \theta)^{1-x}$ ,  $x = 0, 1$  construct SPRT of strength  $(\alpha, \beta)$  for testing  $H_0: \theta = \theta_0$  against  $H_1: \theta = \theta_1$ , ( $\theta_1 > \theta_0$ ).

- B)** Describe  $100(1 - \alpha)\%$  confidence interval for population proportion.

**08**

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

- a) State and prove Neyman Pearson lemma.
- b) Show that the likelihood ratio test leads to t-test for testing  $H_0: \mu = \mu_0$  against  $H_1: \mu \neq \mu_0$  ( $0 < \sigma^2 < \infty$ ) in case of  $N(\mu, \sigma^2)$  distribution where  $\mu_0$  is specified
- c) Based on a random sample of size  $n$  from  $p(x, \lambda) = \frac{e^{-\lambda} \lambda^x}{x!}$   $x = 0, 1, 2, \dots$  show that the most powerful critical region of size not exceeding  $\alpha$  for testing  $H_0: \lambda = \lambda_0$  against  $H_1: \lambda = \lambda_1$  is of the form  $\bar{x} \leq A_\alpha$  if  $\lambda_0 > \lambda_1$  and  $\bar{x} > B_\alpha$  if  $\lambda_0 < \lambda_1$

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

|              |
|--------------|
| <b>Set P</b> |
|--------------|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov - 2022**  
**GEOLOGY (Special Paper - XIII)**  
**Photogeology & Remote Sensing**

Day & Date: Monday, 27-03-2023  
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) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) The shape of a pixel of an image can only be:  
a) Rectangular                      b) Circular  
c) Triangle                          d) Square
- 2) An image that shows finer details is said to be of:  
a) Finer resolution  
b) Coarser resolution  
c) Moderate resolution  
d) None of the above
- 3) Sand along river bank show \_\_\_\_\_ tone in the aerial photograph.  
a) Black                              b) Light  
c) moderate                        d) Bright
- 4) A unique reflectance pattern of individual object on the earth is called as \_\_\_\_\_.  
a) spectral signature              b) optical sign  
c) spatial signature                d) signature
- 5) In GIS vector format, outcrop of granite gneiss is represented by \_\_\_\_\_.  
a) point                              b) line  
c) polygon                          d) all of these
- 6) Which one of the following is NOT a type of resolution of satellite imagery?  
a) spatial                            b) spectral  
c) temporal                         d) non-spatial
- 7) \_\_\_\_\_ sensor produce its own energy source.  
a) Active                            b) Passive  
c) Proximity                        d) Ultrasonic
- 8) The study of the characters of the geological features on earth surface using the aerial photograph is \_\_\_\_\_.  
a) Photointerpretation            b) Photogrammetry  
c) Photo resolution                d) Photo reading
- 9) Imaginary lines drawn parallel to meridian and divide the earth into 180 equally spaced section from north to south are known as \_\_\_\_\_.  
a) Equatorial lines                b) Prime meridian  
c) Longitude                        d) Latitudes

10) The marks present at the centre of borders of aerial photograph is known as \_\_\_\_\_ marks.

- a) Fiducial
- b) Alluvial
- c) Triangular
- d) Principal

**B) Answer the following questions in one sentence.**

**06**

- 1) What is the scale of large-scale aerial photograph?
- 2) List out any three types of information printed on aerial photograph.
- 3) Which EMR has longest wavelength and smallest frequencies?
- 4) What is the format of satellite imageries when used for GIS analysis?
- 5) What processes includes pre-processing of digital images?
- 6) What is IRS?

**Q.2 Answer any Eight of the following**

**16**

- a) What is platform and its types?
- b) How many bands does LANDSAT ETM+ has? Give their spatial resolutions.
- c) What is spectral signature?
- d) How do you recognize sandstone from the aerial photographs?
- e) What is photogrammetry?
- f) What is mosaicking of aerial photographs?
- g) Why water appears black in IR or near IR region?
- h) What is pattern in aerial photographs?
- i) What are Indian Remote Sensing satellite series?
- j) How do you represent vector data?

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Describe simple pocket stereoscope.
- 2) What are the factors affecting aerial photography?
- 3) What are types of passive sensors?

**B) Describe various information printed on the aerial photographs.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) Describe vector data model.
- 2) Describe multispectral sensors.
- 3) Explain atmospheric windows.

**B) Describe components of GIS.**

**08**

**Q.5 Attempt any Two of the following.**

**16**

- a) Explain various errors in flying.
- b) Describe image preprocessing.
- c) Describe various resolutions in satellite images.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Special Paper-XIII)**  
**Microbial Genetics**

Day & Date: Monday, 27-03-2023  
 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.

**Q.1 A) Rewrite the following sentences by selecting correct answers from given alternatives. 10**

- 1) \_\_\_\_\_ dye is used for visualising DNA in electrophoresis.
  - a) Methylene blue
  - b) Ethidium
  - c) Giemsa's stain
  - d) ZNCF
- 2) Semiconservative mode of DNA replication was firstly shown by \_\_\_\_\_.
  - a) Watson and Crick
  - b) Griffith
  - c) Meselson and Stahl
  - d) Wilkinson
- 3) \_\_\_\_\_ of Transcription is the work of sigma factor.
  - a) Initiation
  - b) Elongation
  - c) Fragmentation
  - d) Termination
- 4) \_\_\_\_\_ is an example of homology and similarity tool.
  - a) PROSPECT
  - b) RASMOL
  - c) EMBROSS
  - d) BLAST
- 5) Circular DNA without any helical coiling is called \_\_\_\_\_ DNA.
  - a) Relaxed
  - b) Supercoiled
  - c) Uncoiled
  - d) Nonhelixed
- 6) The computational methodology that tries to identify the best matching between two molecules, a ligand and receptor are known as molecular \_\_\_\_\_.
  - a) Checking
  - b) Docking
  - c) Fitting
  - d) Matching
- 7) Gel electrophoresis separates nucleic acid molecules based on their \_\_\_\_\_.
  - a) Charge
  - b) Chemical nature
  - c) Molecular weight
  - d) Size of the molecules
- 8) RNA dependent DNA polymerase enzyme is also known as \_\_\_\_\_.
  - a) Reverse transcriptase
  - b) RNA primase
  - c) DNA primase
  - d) DNA synthetase
- 9) \_\_\_\_\_ types of deoxynucleoside triphosphates are used in Sanger sequencing.
  - a) 2
  - b) 3
  - c) 4
  - d) 5

- 10) \_\_\_\_\_ is responsible for switching on and off the lac operon.
- a) Lactose
  - b) Glucose
  - c) Galactose
  - d) Beta Galactosidase

**B) Fill in the blank.****06**

- 1) Folded fiber model of chromosome was proposed by \_\_\_\_\_ in 1965.
- 2) Observable characters of organisms are called \_\_\_\_\_.
- 3) Electrophoresis technique was developed by \_\_\_\_\_.
- 4) Alec Jeffrey developed \_\_\_\_\_ technique.
- 5) \_\_\_\_\_ enzyme separates the two strands of DNA during replication.
- 6) The process of formation of RNA from DNA is known as \_\_\_\_\_.

**Q.2 Solve any eight of the following.****16**

- a) In which year Human Genome Project was started?
- b) What is meaning of Leading strand in DNA replication?
- c) What is meaning of Blotting in molecular biology technique?
- d) Define Auxotrophs.
- e) Give the two examples of restriction endonucleases.
- f) What is data mining?
- g) What is full form of EMBL.
- h) What is function of DNA ligase enzyme?
- i) What is function of O gene in Lac Operon? .
- j) How DNA can be useful tool in the forensic applications?

**Q.3 A) Attempt any two of the following.****10**

- 1) Write note on Protein Data Bank.
- 2) Write note on Post transcriptional modifications.
- 3) Describe in detail Lac Operon.

**B) Give in detail applications of Genetic engineering.****06****Q.4 A) Attempt any two of the following****08**

- 1) Describe in brief Electrophoresis of DNA.
- 2) Describe in detail Cis-Trans test.
- 3) Give the concept and applications of Protein Engineering.

**B) Describe in detail structural organisation of *E.coli* chromosome.****08****Q.5 Attempt any two of the following.****16**

- a) Discuss in detail major bioinformatics resources on Internet and their applications.
- b) Describe in detail Tools and Techniques of Genetic Engineering.
- c) Describe in brief DNA sequencing and Fingerprinting.



|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

|            |          |
|------------|----------|
| <b>Set</b> | <b>P</b> |
|------------|----------|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov - 2022**  
**ELECTRONIC (Special Paper – XIII)**  
**Power Electronics**

Day & Date: Monday, 27-03-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) \_\_\_\_\_ is used to protect SCR from high  $dv/dt$ .  
a) Circuit breaker                      b) Fuse  
c) Equalizing circuit                      d) Snubber circuit
- 2) Reverse recovery current depends on \_\_\_\_\_.  
a) storage charge                      b) Temperature  
c) PIV                      d) forward current
- 3) In controlled rectifier \_\_\_\_\_ commutation is used.  
a) forced                      b) load  
c) line                      d) all of these
- 4) The buried gate is fabricated in \_\_\_\_\_.  
a) GTO                      b) SIT  
c) SCR                      d) PUT
- 5) \_\_\_\_\_ is programmable parameter in PUT.  
a) Gate voltage                      b) Load current  
c) Anode voltage                      d) Cathode voltage
- 6) \_\_\_\_\_ circuits are operated with higher frequency.  
a) UPS                      b) Inverters  
c) SMPS                      d) None of these
- 7) In SCR based series inverter \_\_\_\_\_ commutation is used.  
a) Class B                      b) Class C  
c) Class A                      d) Class F
- 8) If the firing angle of the controlled rectifier is small then the average power delivered to the load is \_\_\_\_\_.  
a) very less                      b) more  
c) less                      d) all of these
- 9) In SIT the current will flows due to \_\_\_\_\_.  
a) both majority and minority charge carriers  
b) only minority charge carriers  
c) only majority charge carriers  
d) none of these
- 10) The device that exhibits negative resistance property like UJT is \_\_\_\_\_.  
a) GTO                      b) SIT  
c) IGBT                      d) PUT

- B) Answer the following questions in one sentence. 06**
- 1) Define batching current.
  - 2) Define reverse recovery time of power diode.
  - 3) Define the function of drift layer of power devices.
  - 4) Define threshold voltage of power MOSFET.
  - 5) Define commutation of the SCR.
  - 6) Define holding current.
- Q.2 Answer any Eight of the following 16**
- a) State the concept of  $\frac{dv}{dt}$  triggering.
  - b) State effect of reverse recovery time of power diode.
  - c) State different triggering methods of SCR.
  - d) Give the principle of phase control.
  - e) Explain the need of heat sink in case of power devices.
  - f) State the advantages and disadvantages of SCR.
  - g) Give the classification of the Inverters.
  - h) Define firing angle and conduction angle of SCR.
  - i) Draw constructional diagram of Power MOSFET.
  - j) Draw the circuit diagram of Class D commutation technique.
- Q.3 A) Attempt any Two of the following. 10**
- 1) With suitable constructional diagram explain working of SIT.
  - 2) With suitable waveforms explain action of single phase full wave controlled rectifier with resistive load.
  - 3) With suitable circuit diagram explain working of flasher circuit using SCR.
- B) Explain the action SCR firing by using UJT. 06**
- Q.4 A) Attempt any Two of the following. 08**
- 1) With suitable circuit diagram explain action of emergency lighting system by using SCR.
  - 2) Explain working principle of transistorized inverter circuit.
  - 3) With suitable diagram give the switching characteristics of Power MOSFET.
- B) With suitable constructional diagram explain turn on and turn off process of GTO. 08**
- Q.5 Attempt any Two of the following. 16**
- a) Explain working of Class C commutation of SCR with suitable waveforms.
  - b) With suitable constructional diagram explain working principle of IGBT.
  - c) With suitable waveforms explain the action of single phase half wave controlled rectifier with inductive load and state the significance of free wheel diode.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper- XIV)**  
**Web Technology**

Day & Date: Monday, 27-03-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- 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 or calculator is allowed.

**Q.1 A) Multiple choice questions.**

10

- The \_\_\_\_\_ stores small amount of data in the form of text file on client machine.
  - Session
  - Cookies
  - Application
  - Hidden field
- The process in which a web page sends data to the another page on the server is called as \_\_\_\_\_.
  - AutoPostBack
  - PostBack
  - CrossPagePosting
  - IsPostBack
- By default authentication type of ASP.Net is \_\_\_\_\_.
  - Passport
  - Form
  - Windows
  - File
- A \_\_\_\_\_ Control does not have the Click and Command events.
  - Hyperlink
  - Link Button
  - Image Button
  - Command Button
- The \_\_\_\_\_ control has a in-built support for Sort, Filter and paging the Data.
  - DataList
  - Repeater
  - FormView
  - DataGrid
- The \_\_\_\_\_ method executes the command and returns the number of rows that were affected.
  - ExecuteNonQuery
  - ExecuteScaler
  - ExecuteReader
  - ExecuteQuery
- The \_\_\_\_\_ property o Tree View control is used to show checkboxes for nodes.
  - DisplayCheckBoxes
  - ShowCheckBoxes
  - AssignCheckBoxes
  - CheckBoxes

- 8) The \_\_\_\_\_ property of Compare Validator control is used to compare with constant value.  
a) ConstantToCompare      b) ControlToCompare  
c) ValueToCompare      d) ConstantValueToCompare
- 9) The \_\_\_\_\_ method removes all rows from all tables in the DataSet:  
a) Clear ( )      b) Del ( )  
c) Delete ( )      d) Remove ( )
- 10) Timer control has \_\_\_\_\_ event.  
a) Timer\_Time      b) Timer\_Tick  
c) Timer\_Click      d) Timer\_Execute

**B) Fill in the Blanks.****06**

- 1) By default value for is valid property is \_\_\_\_\_.
- 2) Every Ajax control must be included in \_\_\_\_\_ control.
- 3) Every ASP.Net website contains \_\_\_\_\_ number of Global.asax file.
- 4) Every master page has \_\_\_\_\_ directive.
- 5) The ImageMap control has \_\_\_\_\_ hotspots.
- 6) The import directive has only \_\_\_\_\_ attribute.

**Q.2 Answer the followings (Any Eight):****16**

- 1) What is a connection string?
- 2) What is IsPostBack? Give example.
- 3) What is Namespace? List at least 4 namespaces used in a database application.
- 4) What is the use of custom validator control?
- 5) What is timer control? Give example.
- 6) What are the types of ASP.Net tracing? Explain each in one line.
- 7) What is the use of themes? Explain how to create it.
- 8) What are the different types of lists used in ASP.Net?
- 9) Give the regular expression for validating pin code number and email id.
- 10) What are different events available in Global.asax file?

**Q.3 A) Answer the followings (Any two):****10**

- 1) What are nested master pages? Explain event ordering in master pages.
- 2) What is site navigation? Explain the SiteMap file and SiteMapPath control with example.
- 3) What is Ajax? Explain the Server-side and client-side architecture of Ajax.

- B)** What is the use of \ App\_GlobalResources and \App\_Local Resources? **06**  
Explain with an example.

- Q.4 A) Answer the followings (Any two):** **08**
- 1) Design a web page that demonstrates at least 10 advertisements using AdRotator control.
  - 2) What are the advantages and disadvantages of client-side and server-side validations? Explain Validation summary control and IsValid property with an example.
  - 3) Design a web page that displays 10 friends' birthdays in the calendar control.
- B) Design a web page that inserts, selects, and updates records.** **08**
- Q.5 Answer the following (Any Two).** **16**
- a) What is directives used in ASP.Net? Explain each directive in detail.
  - b) What is the state management technique? Explain server side state management with example.
  - c) What is Authentication & Authorization? Explain role management in details.

|             |  |
|-------------|--|
| Seat<br>No. |  |
|-------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper – XV)**  
**Materials Science**

Day & Date: Monday, 06-02-2023  
 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) Neat diagrams must be drawn wherever necessary.  
 4) Use of log table or calculator is allowed.

**Q.1 A) Choose the correct alternatives from the options. 10**

- 1) The reciprocal of conductivity is \_\_\_\_\_.  
 a) resistivity                      b) capacity  
 c) dielectric strength              d) inductivity
- 2) Applied force per unit cross-sectional area of a body is called \_\_\_\_\_.  
 a) strain                              b) stress  
 c) creep                                d) ductility
- 3) \_\_\_\_\_ polymer is prepared by condensation polymerization.  
 a) PVC                                b) Nylon 66  
 c) Starch                                d) Teflon
- 4) Bakelite is obtained by reaction of formaldehyde with \_\_\_\_\_.  
 a) Phenol                              b) styrene  
 c) ethane                                d) urea
- 5) Thermal conductivity of ceramics is \_\_\_\_\_.  
 a) greater than metal              b) zero  
 c) infinity                                d) less than metal
- 6) Ceramics normally exhibit \_\_\_\_\_ nature.  
 a) sort                                  b) hard  
 c) brittle                                d) elastic
- 7) The combination of two or more materials which have different properties from constituent materials are called \_\_\_\_\_.  
 a) Polymer                              b) crystalline  
 c) composite                            d) amorphous

- 8) The strength of composite is \_\_\_\_\_.
  - a) low
  - b) high
  - c) zero
  - d) infinite
- 9) When grain size reduces to nanoscale, then the material becomes \_\_\_\_\_.
  - a) soft
  - b) elastic
  - c) plastic
  - d) stronger and harder
- 10) Sol-Gel is \_\_\_\_\_ method of synthesis of nanomaterials.
  - a) Physical
  - b) Hybrid
  - c) Chemical
  - d) Electrical

**B) Fill in the Blanks.**

06

- 1) Time dependent permanent deformation is called \_\_\_\_\_.
- 2) Polymers are long chain organic macromolecules having \_\_\_\_\_ as a common element in their structure.
- 3) The materials which finds application in the field of medicine are called \_\_\_\_\_.
- 4) The tanning operations on skin of animal produces \_\_\_\_\_.
- 5) \_\_\_\_\_ technique is used to determine the crystal structure of material.
- 6) 1 nanometer = \_\_\_\_\_ meter.

**Q.2 Answer the followings. (Any Eight)**

16

- 1) Define the terms (i) hardness (ii) fatigue
- 2) Calculate the conductivity of copper having resistivity  $18 \times 10^{-9} \Omega cm$ .
- 3) What is degree of polymerization?
- 4) Define polymerization mechanism.
- 5) Give any two examples of ceramics.
- 6) Write any two applications of composite materials.
- 7) What is biomechanism?
- 8) Give any two examples of biomaterials.
- 9) Explain the term deposition.
- 10) Give two Properties of nanomaterials.

**Q.3 A) Answer the followings (Any two):**

10

- 1) Explain classification of materials in detail.
- 2) What is homo- polymer and co- polymer? Give three applications of polymers.
- 3) Explain Co-precipitation method of nanomaterial synthesis.

**B) What is ceramics? Explain Rock Salt (NaCl) structure with suitable diagram.**

06

- Q.4 A) Answer the followings (Any two):** **08**
- 1) Explain electric and magnetic properties of materials.
  - 2) Give four applications of polymers.
  - 3) Describe Chemical vapour deposition method of synthesis of nanomaterials.
- B) Give four properties and four applications of biomaterials.** **08**
- Q.5 Answer the following (Any Two).** **16**
- a) Explain steps of ceramic processing. Give properties and applications of ceramics.
  - b) Explain fiber-reinforced composites. Give five properties of composites.
  - c) What is Bottom-up and Top-down approaches. Explain chemical vapors deposition method of synthesis.





- 10) Methyl lithium contains \_\_\_\_\_ bond.
- |            |            |
|------------|------------|
| a) (4C-1e) | b) (4C-2e) |
| c) (4C-3e) | d) (4C-4e) |

**Q.1 B) Give the definitions of the following. 06**

- 1) Transuranic elements
- 2) Semiconductors
- 3) Metallic bond
- 4) Noble gases
- 5) Passivity
- 6) Organometallic compounds

**Q.2 Answer the followings (Any Eight): 16**

- 1) Name the Cerium and Yttrium group minerals.
- 2) What are lanthanides and actinides? Why are they called f - block elements?
- 3) Explain why  $\text{YBa}_2\text{Cu}_3\text{O}_7$  is called as 123 superconductor.
- 4) Give applications of semiconductors (any four).
- 5) Distinguish between Diborane and Ethane.
- 6)  $\text{XeF}_2$  is a linear molecule. Why?
- 7) Mention the factors affecting corrosion.
- 8) What are passivators? Give the different types of passivators.
- 9) What are carbonyls? Give their classification with suitable example.
- 10) What is type of hybridization in  $\text{Fe}(\text{CO})_5$ .

**Q.3 A) Answer the followings (Any two): 10**

- 1) Explain ion exchange method for separation of lanthanides.
- 2) Give the structure of  $\text{P}_4\text{O}_{10}$
- 3) Explain oxide film theory of passivity.

**B) How the solids are classified as conductors, semiconductors and insulators on the basis of band theory. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Give the synthesis and structure of dimethyl beryllium.
- 2) Mention general methods of preparation of transuranic elements. Explain heavy ion bombardment method.
- 3) Explain the bulk separation method of lanthanides.

**B) What is corrosion? Explain it with electrochemical theory. Mention the methods of protection of metals from corrosion. 08**

**Q.5 Answer the following (Any Two). 16**

- a) Give the names, symbols, atomic numbers and electronic configuration of Lanthanons.
- b) What are types of semiconductors? Explain n-type and p-type semiconductors.
- c) Discuss in detail the structure of diborane.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

- 11) Vectors are isolated from \_\_\_\_\_.  
a) Bacteria  
b) Cytoplasm  
c) Genome  
d) Plants
- 12) \_\_\_\_\_ antibiotic resistant sites are present on vector.  
a) Amphoticylin  
b) Tetracyclin  
c) Both a & b  
d) All antibiotics
- 13) \_\_\_\_\_ temperature of denaturation step.  
a) 4°  
b) 95°  
c) 70°  
d) 100°
- 14) Cosmid shows presence of \_\_\_\_\_ site.  
a) COS Site  
b) TDNA site  
c) DNA site  
d) None
- 15) \_\_\_\_\_ media used in Tissue culture.  
a) MS media  
b) PDA  
c) Specialized  
d) Nutrient Agar
- 16) In tissue culture the plants produce without callus formation is called as \_\_\_\_\_.  
a) Direct propagation  
b) Indirect propagation  
c) Both a & b  
d) Multiplication

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

16

- Define R-DNA Technology.
- Write a note on PBR 322.
- Applications of anther culture.
- Somatic hybridization.
- Restriction endonucleases.
- Applications of Recombinant DNA technology.
- Denaturation step in PCR.
- Function of ligase.
- Define callus.
- What is DNA library?

**Q.3 A) Write short notes on any two of following.**

12

- 1) What are the properties of good vector & describe Agro bacterium as vector?
- 2) Give the process of golden rice.
- 3) Describe role of enzymes involved in R-DNA Technology.

**B) Write short notes on.**

04

Describe the process of northern blotting.

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

16

- Write a note on Southern blotting.
- Role of Biotechnology in agriculture.
- Describe methods of gene transformation.

**Q.5 Answer any two of the following.**

16

- Describe in detail the process of PCR.
- Describe process of protoplast isolation.
- Describe the process of micropropagation along with its types.



- 10) Golden age of reptiles \_\_\_\_\_.  
a) coenozoic era                      b) Proterozoic era  
c) Mesozoic era                        d) Psychozoic era

**Q.1 B) All in the blank/Definition/One sentence answer/ One word answer/ 06**  
**Give the name/Predict the product etc.**

- 1) Gene pool
- 2) Mutation
- 3) Variation
- 4) Evolution
- 5) Migration
- 6) Extinction

**Q.2 Answer the followings (Any Eight):** **16**

- 1) Homosapiens
- 2) Chemogeny
- 3) Molecular evolution
- 4) Natural selection
- 5) Cline
- 6) Species
- 7) Isolation
- 8) RNA world
- 9) Genetic drift
- 10) Mass extinction

**Q.3 A) Answer the followings (Any two):** **10**

- 1) Evolution of eukaryotes
- 2) Adaptive radiation
- 3) Give sources of variations

**B) Write Short note on Darwinism. 06**

**Q.4 A) Answer the followings (Any two):** **08**

- 1) Lamarckism
- 2) Types of fossils
- 3) Organic evolution

**B)** Describe and derive equation for Hardy Weinberg law. **08**

**Q.5 Answer the following (Any Two).** **16**

- Describe Neo-Darwinism.
- Explain geological time scale with reference to eras.
- Explain different modes of speciation.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**Mathematics (Special Paper- XIV)**  
**Numerical Analysis**

Day & Date: Monday, 06-02-2023  
 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 the scientific calculators are allowed.

**Q.1 A) Choose the correct alternative for each of the following. 10**

- 1) Find  $\nabla^2 y_8 =$  \_\_\_\_\_
  - a)  $y_8 + 2y_7 + y_6$
  - b)  $y_8 - 2y_7 + y_6$
  - c)  $y_{10} - 2y_9 + y_8$
  - d)  $y_{10} + 2y_9 + y_8$
- 2) If  $\Delta^2(ab^{cx}) =$  \_\_\_\_\_
  - a)  $a(b^c - 1)^2 b^{cx}$
  - b)  $a(b - 1)^2 b^{cx}$
  - c)  $a(b^c + 1)^2 b^{cx}$
  - d)  $a(b - 1)^c b^{cx}$
- 3) If  $(E^{1/2} + E^{-1/2})(1 + \Delta)^{1/2} =$  \_\_\_\_\_
  - a)  $\Delta + 1$
  - b)  $\Delta - 1$
  - c)  $\Delta - 2$
  - d)  $\Delta + 2$
- 4) If  $\Delta \nabla =$  \_\_\_\_\_
  - a)  $\delta$
  - b)  $\mu$
  - c)  $\delta^2$
  - d)  $\mu^2$
- 5) The solution of  $y_{n+2} - 4y_n = 0$  such that  $y_0 = 0, y_1 = 2$  is \_\_\_\_\_.
  - a)  $y_n = (2)^{n-1} - (-2)^{n-1}$
  - b)  $y_n = (2)^{n-1} + (-2)^{n-1}$
  - c)  $y_n = (2)^n - (-2)^n$
  - d)  $y_n = (2)^n + (-2)^n$
- 6) The particular integral of  $u_{n+2} - 5u_{n+1} + 6u_n = 4^n$ 
  - a)  $-\frac{4^n}{2}$
  - b)  $\frac{4^n}{2}$
  - c)  $-\frac{n^4}{2}$
  - d)  $\frac{n^4}{2}$
- 7) If  $y_{x+2} y_x = y_{x+1}^2$  put  $\frac{y_{x+1}}{y_x} = U_x$  then  $U_x =$  \_\_\_\_\_.
  - a)  $U_x = c_1 (-2)^x$
  - b)  $U_x = c_1 (2)^x$
  - c)  $U_x = c_1 (1)^x$
  - d)  $U_x = c_1 (-1)^x$
- 8) Gauss backward interpolation formula is used interpolate value of  $y$  for
  - a)  $0 < P < 1$
  - b)  $0 < P < \alpha$
  - c)  $-1 < P < 0$
  - d)  $-\alpha < P < 0$

- 9) Interpolation is the technique of estimate the values of a function for any \_\_\_\_.
- Intermediate value of function
  - Intermediate value of variable
  - Intermediate value of constant
  - Both (a) and (b)
- 10) In Trapezoidal rule, the function  $y = f(x)$  is take to be
- Straight line
  - Ettipes
  - Parabola
  - Circe

**B) Fill in the blank of the following.****06**

- The solution of  $6y_{n+2} + 5y_n - 6y_n = 0$  is \_\_\_\_.
- Using forward differences, the formula for  $f'(\alpha) =$  \_\_\_\_.
- Gauss forward interpolation formula is used to interpolate value of  $y$  for \_\_\_\_.
- $\Delta^r y_k$  in terms of backward differences \_\_\_\_.
- If  $f(x) = 3x^3 - 2x^2 + 1$ , then  $\Delta^3 f(x) =$  \_\_\_\_.
- The value of  $E^{-1}\nabla =$  \_\_\_\_ in difference

**Q.2 Solve any Eight of the following.****16**

- Using Newton's forward interpolation formula find  $\frac{dy}{dx}$
- Find  $\cos(1.74)$  from the following table.
- Prove that  $\Delta = E \nabla = \nabla E$
- Prove that  $\Delta(n_{c_{r+1}}) = n_{c_r}$
- Find the missing  $y_x$  values from the first difference provided

|            |        |        |        |        |        |
|------------|--------|--------|--------|--------|--------|
| $x:$       | 1.7    | 1.74   | 1.78   | 1.82   | 1.86   |
| $\sin x :$ | 0.9916 | 0.9857 | 0.9781 | 0.9691 | 0.9584 |

|                |   |   |   |   |   |    |
|----------------|---|---|---|---|---|----|
| $y_x :$        | 0 | - | - | - | - | -  |
| $\Delta y_x :$ | 0 | 1 | 2 | 4 | 7 | 11 |

- With usual notation prove that  $E = e^{hD}$
- Solve  $y_{n+1} - 2y_n \cos \alpha + y_{n-1} = 0$
- Solve  $u_{n+2} - 4u_{n+1} + 4u_n = 2^n$
- Find the polynomial  $f(x)$  by using Lagrange's formula

|         |   |   |    |     |
|---------|---|---|----|-----|
| $x:$    | 0 | 1 | 2  | 5   |
| $f(x):$ | 2 | 3 | 12 | 147 |

- Find the difference table for the following data

|                   |       |       |       |       |       |
|-------------------|-------|-------|-------|-------|-------|
| Marks :           | 30-40 | 40-50 | 50-60 | 60-70 | 70-80 |
| No. of students : | 31    | 42    | 51    | 35    | 31    |

**Q.3 A) Attempt any two of the following****10**

- Find the difference equation corresponding to the family of curves  $y = ax + bx^2$
- Find the cubic polynomial which takes the following values

|         |   |   |   |    |
|---------|---|---|---|----|
| $x:$    | 0 | 1 | 2 | 3  |
| $f(x):$ | 1 | 2 | 1 | 10 |

Hence find the value  $f(4)$ 

- Evaluate (i)  $\Delta^2\left(\frac{5x+2}{x^2+5x+6}\right)$  (ii) prove that  $\Delta^3 y_2 = \nabla^3 y_5$



- B)** State and prove Simpson's one third rule, and hence evaluate  $\int_0^1 \frac{x^2}{1+x^3} dx$  **06**  
 take  $h = 0.25$

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

- 1) Prove that usual notation  $\mu = \frac{2+\Delta}{2\sqrt{1+\Delta}} = \sqrt{1 + \frac{1}{4}\sigma^2}$
- 2) For what values of  $x, y$  is minimum for the following table

|      |       |       |       |       |       |       |
|------|-------|-------|-------|-------|-------|-------|
| $x:$ | 3     | 4     | 5     | 6     | 7     | 8     |
| $y:$ | 0.205 | 0.240 | 0.259 | 0.262 | 0.250 | 0.224 |

- 3) Solve  $y_{n+2} - 4y_n = n^2 + n - 1$

- B)** State and prove Newton's forward interpolation formula. **08**

**Q.5 Attempt any two of the following.** **16**

- a)** Evaluate  $\int_0^1 \frac{d_x}{1+x^2}$  using

- 1) Trapezoidal rule taking  $h = \frac{1}{4}$
- 2) Simpson's  $\left(\frac{1}{3}\right)^{rd}$  rule taking  $h = \frac{1}{4}$
- 3) Simpson's  $\left(\frac{3}{8}\right)^{th}$  rule taking  $h = \frac{1}{6}$

- b)** Solve

- 1)  $y_{x+2}^2 - 3y_{x+1} y_x + 2y_x^2 = 0$
- 2)  $y_{n+2} - 2 \cos \alpha \cdot y_{n+1} + y_n = \cos \alpha n$

- c)** 1) State and prove Lagrange's interpolation formula.  
 2) A curve pass through the points  $(0,18), (1,10), (3,-18)$  and  $(6,90)$   
 find the slope of the curve at  $x = 2$

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper-XIV)**  
**Probability Theory**

Day & Date: Monday, 06-02-2023  
 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) Select the most correct alternative. 10**

- 1) A sequence  $\{X_n\}$  is said to converge in quadratic mean to  $X$  if \_\_\_\_\_.  
 a)  $\lim_{x \rightarrow \infty} P[|X_n - X|] = 0$       b)  $\lim_{x \rightarrow \infty} P[|X_n - X|^2] = 0$   
 c)  $\lim_{x \rightarrow \infty} E|X_n - X|^2 = 0$       d) None of these
- 2) A state  $i$  is absorbing state if \_\_\_\_\_.  
 a)  $P_{ii} = 1$       b)  $P_{ij} = 0$ , for all  $j \neq i$   
 c) both a and b      d) neither a nor b
- 3) If a random sample of size  $n$  is drawn from  $U(0,1)$  distribution then the distribution of first order statistic is identical to \_\_\_\_\_.  
 a)  $\beta_2(1, n)$       b)  $\beta_1(1, n)$   
 c)  $U(0,1)$       d) None of these
- 4) In  $M/M/1: \infty / \text{FIFO}$  model, if  $\rho$  is traffic intensity, probability that there are  $n$  customers in the system is  
 a)  $\rho^n$       b)  $1 - \rho^n$   
 c)  $\rho^n(1 - \rho)$       d)  $\rho(1 - \rho)$
- 5) Which of the following is an order statistic?  
 a) sample median      b) sample mean  
 c) sample mode      d) both a & b
- 6) In a Markov chain state  $j$  is said to be accessible from state  $i$  if \_\_\_\_\_.  
 a)  $P_{ji}^{(n)} > 0, n \geq 1$       b)  $P_{ij}^{(n)} > 0, n \geq 1$   
 c)  $P_{ij}^{(n)} = 0, n \geq 1$       d)  $P_{ij} = 0$
- 7) A state  $i$  is said to be transient if ultimate return to it has probability \_\_\_\_\_.  
 a) 1      b)  $< 1$   
 c) 0      d) Either a or c
- 8) A queue length will be finite if arrival rate  $\lambda$  and service rate  $\mu$  have relation \_\_\_\_\_.  
 a)  $\lambda = 0.75 \mu$       b)  $\lambda > \mu$   
 c)  $\lambda = 0.50 \mu$       d)  $\lambda \neq \mu$
- 9) Convergence in quadratic mean implies \_\_\_\_\_.  
 a) convergence in probability  
 b) convergence in distribution  
 c) convergence in normal distribution  
 d) none of these

- 10) While deriving the pdf of  $k^{th}$  order statistic we use concept of \_\_\_\_\_.  
 a) multinomial distribution      b) uniform distribution  
 c) both a and b      d) neither a nor b

**B) Attempt the following.**

**06**

- 1) State the p.d.f. of  $n$ th order statistic.
- 2) Define convergence of a sequence of random variables in probability.
- 3) Define transition probability matrix.
- 4) In  $M/M/1 : \infty /FIFO$  model if arrival rate is  $\lambda$  & service rate is  $\mu$ , what is the probability that the server is idle?
- 5) Define stochastic process.
- 6) Define convergence of sequence of random variables in quadratic mean to a random variable.

**Q.2 Solve any eight of the following.**

**16**

- a) If  $\lambda$  (arrival rate) = 12 per hour and  $\mu$  (service rate) 15 per hour in  $M/M/1$  model then find average length of queue of the system.
- b) It is known that customers arrive at a rate of 10 per hour and service rate is 12 customers per hour, then according to  $M/M/1$  model, find the expected waiting time of customer in the queue.
- c) For a Markov chain  $\{X_n, n \geq 0\}$ ,  $P^0 = (0.5 \ 0.5)$  and

$$P = \begin{matrix} & \begin{matrix} 0 & 1 \end{matrix} \\ \begin{matrix} 0 \\ 1 \end{matrix} & \begin{bmatrix} 1/3 & 2/3 \\ 3/4 & 1/4 \end{bmatrix} \end{matrix}$$

Obtain  $P(X_2 = 0 \mid X_0 = 0)$

- d) Define Markov Chain?
- e) Let  $X_1, X_2, \dots, X_n$  be a random sample from  $U(0,2)$ . Find the p.d.f of minimum  $(X_1, X_2, \dots, X_n)$ .
- f) In usual notation write down the joint p.d.f. of  $(Y_r, Y_s)$ ,  $(r < s)$
- g) State weak law of large numbers for i.i.d. random variables.
- h) Define convergence of a sequence of random variables in distribution.
- i) Define communicative states.
- j) State the conditions for existence of W.L.L.N.

**Q.3 A) Attempt any two of the following.**

**10**

- 1) Let  $\{X_k\}$  be a sequence of i.i.d. random variables with mean  $\mu$  and finite variance  $\sigma^2$ .  
 Let  $S_n = X_1 + X_2 + \dots + X_n$ . Test whether W.L.L.N. holds good for this sequence.
- 2) Let  $Y_1 < Y_2 < Y_3 < Y_4 < Y_5$  be a order statistic with respect to a random sample of size 5 from  $\exp(\theta)$  distribution. Find the distribution of sample median.
- 3) What do you mean by
  - i) balking
  - ii) reneging
  - iii) jockeying
 with respect to queuing process.

- B)** Consider the Markov chain with three states  $\{1,2,3\}$ , that has the following transition matrix. **06**

$$P = \begin{bmatrix} \frac{1}{2} & \frac{1}{4} & \frac{1}{4} \\ \frac{1}{3} & 0 & \frac{2}{3} \\ \frac{1}{2} & \frac{1}{2} & 0 \end{bmatrix}$$

If we know  $P(X_1 = 1) = P(X_1 = 2) = 1/4$ , find  $P(X_1 = 3, X_2 = 2, X_3 = 1)$ .

- Q.4 A) Attempt any two of the following.** **08**

- 1) State the Chapman - Kolmogorov equation for obtaining higher transition probabilities of a Markov chain.
- 2) Explain briefly what do you understand by transient state and steady state in queuing problem.
- 3) Find the distribution of range, if a random sample is taken from  $U(0,1)$  distribution.

- B)** Let  $Y_n$  be the  $n^{\text{th}}$  order statistic corresponding to a random sample from  $U(0,1)$  distribution. **08**  
Find the distribution of  $Y_n$  and test  $Y_n \rightarrow 1$  in probability as  $n \rightarrow \infty$

- Q.5 Attempt any two of the following.** **16**

- a)** For the T.P.M.

$P = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$ , Find  $P^2$  and verify the same using Chapman Kolmogorov equation.

- b)** Let  $Y_1 < Y_2 < Y_3 < Y_4$  be a order statistics with respect to a random sample of size 4 from exp (3) distribution. Find the mean & variance of minimum of the random sample.

- c)** Suppose  $X_1, X_2, \dots, X_n$  are i.i.d. random variables with common p.d.f.  
 $f(x) = e^{-x}; 0 < x < \infty$   
 $= 0$  ; otherwise

Examine the convergence of smallest order statistic  $X_{(1)}$  in probability.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov - 2022**  
**GEOLOGY (Special Paper – XIV)**  
**Geomorphology and Geotectonic**

Day & Date: Monday, 06-02-2023  
 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) Fill in the blanks by choosing correct alternatives given below. 10**

- 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) A landscape produced by the effect of many cycles of erosion of is called as \_\_\_\_\_.
  - a) monocyclic
  - b) multicyclic
  - c) exhumed
  - d) resurrected
- 3) The "Inversion of relief" is found in \_\_\_\_\_ region.
  - a) Folded
  - b) Faulted
  - c) non-jointed
  - d) highly jointed
- 4) Choose the incorrect statement about Himalayan rivers.
  - a) Their tributaries are engaged in headward erosion.
  - b) Pot holes are normal features.
  - c) They are more sinuous and develop numerous meanders
  - d) Long profiles of rivers are characterized by rapids and water falls.
- 5) Radial or centrifugal drainage pattern forms over \_\_\_\_\_.
  - a) Circular basin
  - b) domal structure
  - c) elongated ridge
  - d) oceanic cliffs
- 6) 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
- 7) What happens to rock around a subducting slab?
  - a) It goes under the other plate.
  - b) It goes over the other plate.
  - c) It combines with the other rock.
  - d) It disappears from Earth.
- 8) The rock which is well polished by wind abrasion is called \_\_\_\_\_.
  - a) Yardangs
  - b) Pedestal rock
  - c) Ventifacts
  - d) Desert pavements
- 9) The mechanical loosening and removal of the material from the rocks due to pressure exerted by the running water is called \_\_\_\_\_.
  - a) Gradient
  - b) Weathering
  - c) Hydraulic action
  - d) Cavitation

10) The gently sloping land part that remains partly submerged under seawater is \_\_\_\_\_

- a) Continental shelf                      b) Continental bench
- c) Beach                                      d) Continental slope

**B) Answer the following questions in one sentence.**

**06**

- 1) Name the exogenetic processes.
- 2) What causes dynamic rejuvenation?
- 3) Which feature along the river represent Knick point?
- 4) What is another name of supercontinent?
- 5) What is lithosphere?
- 6) What is headward erosion?

**Q.2 Answer any Eight of the following**

**16**

- a) What are convection currents?
- b) What is seif?
- c) What are three types of moraines?
- d) Where transform faults occur?
- e) Which agent is responsible for the deposition of stalactite and stalagmites?
- f) What is gorge?
- g) What is degradation?
- h) Where do you find sea notch?
- i) What is the term for collision of two plates?
- j) Name the zone where one plate slide below the other?

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Explain Interruptions in erosion cycle due to Base level Changes.
- 2) Island arc.
- 3) Give the list of large and small plates.

**B) Explain the term 'Uniformitarianism'.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) Transportation by ocean.
- 2) Give any four evidences to support continental drift theory.
- 3) Characteristics of old stage river.

**B) Mid-Oceanic Ridges.**

**08**

**Q.5 Attempt any Two of the following.**

**16**

- a) Give topographic evidences of rejuvenation.
- b) Describe in detail erosional features formed by the work of river.
- c) Describe in detail epigenic and exogenic processes.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov - 2022**  
**MICROBIOLOGY (Special Paper- XIV)**  
**Microbial Biochemistry**

Day & Date: Monday, 06-02-2023  
 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 labeled diagrams wherever necessary.

**Q.1 A) Choose the correct alternatives form options. 10**

- 1) Urease is example of \_\_\_\_\_ specificity.
  - a) relative
  - b) group
  - c) absolute
  - d) bond
- 2) \_\_\_\_\_ is precursor for biosynthesis of Peptidoglycan.
  - a) Sucrose
  - b) Maltose
  - c) Glucose
  - d) Fructose
- 3) In \_\_\_\_\_ CAP/CRP binds with DNA.
  - a) Catabolite repression
  - b) End product repression
  - c) Feedback inhibition
  - d) Competitive inhibition
- 4) Bioluminescence is known as \_\_\_\_\_.
  - a) Cold sterilization
  - b) Flurexin
  - c) Cold light
  - d) Luciferin
- 5) \_\_\_\_\_ is starting amino acid in protein synthesis in procaryotes.
  - a) Methionine
  - b) N-formyl methionine
  - c) Aspartic acid
  - d) Alanine
- 6) When  $V_0 = \frac{1}{2} V_{\max}$  then  $K_m =$  \_\_\_\_\_.
  - a) [E]
  - b) [S]
  - c) [ES]
  - d) [P]
- 7) \_\_\_\_\_ play important role in  $\beta$ -14 linkage formation in backbone of N-acetyl glucosamine and N-acetylmuramic acid.
  - a)  $C_{55}$  lipid
  - b)  $C_{73}$  lipid
  - c)  $C_{17}$  lipid
  - d)  $C_{30}$  lipid
- 8) \_\_\_\_\_ acid contains pyrimidine nucleus and is the key intermediate in pyrimidine synthesis.
  - a) Inosinic
  - b) Acetic
  - c) Citric
  - d) Orotic
- 9) \_\_\_\_\_ is group specific enzyme.
  - a) Cellulase
  - b) Amylase
  - c) Caseinase
  - d) Hexokinase
- 10) \_\_\_\_\_ is the major component of RNA but not DNA.
  - a) Adenine
  - b) Uracil
  - c) Guanine
  - d) Thymine

- Q.1 B) Answer in one or two words. 06**
- 1) Write correct Michaelis Menten equation.
  - 2) List nonsense codons
  - 3) Who crystallized urease enzyme?
  - 4) What is long form of CEOGAT?
  - 5) Give names of key enzymes of glyoxylate cycle.
  - 6) Which enzyme involved in cross linkage formation in peptidoglycan biosynthesis?
- Q.2 Answer the following questions (Any Eight) 16**
- 1) What is function of ara-c protein in arabinose operon?
  - 2) Define cofactor.
  - 3) Define coenzyme.
  - 4) What is habitat of Bioluminescent organisms.
  - 5) Define allosteric enzyme.
  - 6) Which amino acids are commonly present in active site of enzyme?
  - 7) What is nucleoside?
  - 8) Define Isozyme.
  - 9) Define Translocation.
  - 10) Tryptophan operon
- Q.3 A) Answer the following questions (Any two) 10**
- 1) Extraction of intracellular enzymes
  - 2) Initiation of protein synthesis
  - 3) Lock and key hypothesis
- B) Write short note on – 06**
- Assimilation of sulfur
- Q.4 A) Answer the following questions (Any two) 08**
- 1) Proximity and orientation
  - 2) Pyruvate as key metabolite
  - 3) Acid - base catalysis
- B) Explain in detail Assimilation of carbon. 08**
- Q.5 Answer the following questions (Any two) 16**
- a) Glyoxylate bypass
  - b) Immobilization of enzymes
  - c) Mechanism of action of allosteric enzymes (Two models of action)



|                     |  |
|---------------------|--|
| <b>Seat<br/>No.</b> |  |
|---------------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov - 2022**  
**ELECTRONICS (Special Paper- XIV)**  
**Embedded System Design**

Day & Date: Monday, 06-02-2023  
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) Neat diagrams must be drawn wherever necessary.  
4) Use of log table or calculator is allowed.

**Q.1 A) Choose the correct alternatives from the options. 10**

- 1) Which one of these is not an embedded product?  
a) Mouse                                      b) Keyboard  
c) TV remote                                  d) Laptop
- 2) The main component of an embedded system is \_\_\_\_\_.  
a) Memory                                    b) Application specific circuitry  
c) Microcontroller                          d) Communication interface
- 3) In uC89C51. the hardware RESET is \_\_\_\_\_.  
a) Active high                                b) Active low  
c) both a and b                               d) high impedance
- 4) C programs are converted into machine language using \_\_\_\_\_.  
a) an assembler                              b) an interpreter  
c) a compiler                                  d) an operating system
- 5) Which one of these is not a C keyword?  
a) char                                         b) if  
c) while                                         d) next
- 6) Which one of these statements in C is a loop control statement?  
a) if                                              b) if-else  
c) switch-case                                d) for
- 7) The data type used for addressing bit addressable SFR bit is \_\_\_\_\_.  
a) sbit                                          b) bit  
c) sfr                                             d) int
- 8) The header file required for writing an embedded C program for uC 8051 family is \_\_\_\_\_.  
a) std51.h                                      b) 8051.h  
c) reg51.h                                      d) uC51.h
- 9) Which one of these is not a 4-bit code for full-stepping a stepper motor?  
a) A                                              b) 9  
c) 6                                              d) 8

- 10) To display alphanumeric data on LCD, the data is sent in \_\_\_\_\_ format.
- |              |                  |
|--------------|------------------|
| a) ASCII     | b) BCD           |
| c) 7-Segment | d) alpha-numeric |

**Q.1 B) Fill in the blanks. 06**

- 1) The size of unsigned integer data type is \_\_\_\_\_ bytes.
- 2) A microcontroller-based, software driven, reliable and real-time system, operating on diverse physical variables in diverse environment at a lesser cost is called \_\_\_\_\_ system.
- 3) If the a-b-c-d-e-f-g segments of common-anode seven segment display are connected to port pins P1.0 to P1.6 (Pin P1.7 unused), the HEX code for displaying numeric 7 will be \_\_\_\_\_.
- 4) The delimiter "Square Bracket [ ]" is used in C-programs for \_\_\_\_\_.
- 5) The operator "^" is used in embedded-C for \_\_\_\_\_.
- 6) Which port of uC89C51 require external passive pull-up resistors?

**Q.2 Answer the followings (Any Eight): 16**

- 1) Name any four applications of an embedded system
- 2) What is Power-On-Reset in uC8051?
- 3) Explain the role of Compiler in short.
- 4) What is Global Declaration in C programming?
- 5) Give the concept of Super-loop.
- 6) Write the embedded C instructions to declare Port-0 as input port and Port-1 as output port.
- 7) Give the basic principle of speed control of DC motor using PWM technique.
- 8) What is Humidity? Explain in short.
- 9) Explain the role of Header files in C programming.
- 10) What is difference between C and Embedded-C?

**Q.3 A) Answer the followings (Any two): 10**

- 1) Write a C program to arrange ten integer numbers in ascending or descending order.
- 2) Write an embedded-C program to turn ON and turn OFF the relay connected to port line P1.5 with long delay.
- 3) Draw the interfacing diagram for Seven-Segment Display connected to Port-1 of uC 89C51 and write the embedded-C program.

**B) Explain with neat block diagram, the architecture of an Embedded System. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Explain the data types in C.
- 2) Discuss various bit-wise operators in embedded-C.
- 3) Explain the interfacing of Thumb-wheel switch

**B) Design 89C51 based embedded system for measurement of temperature in degree Celsius. 08**

**Q.5 Answer the following (Any Two).****16**

- a) Explain the interfacing of LCD to uC 89C51 and hence display "PAHSU Solapur" on LCD.
- b) Design uC 89C51 based embedded system for speed control of DC motor using PWM technique.
- c) Write an embedded-C program to generate a square wave on port pin P1.5, with and without the use of timers, and explain.

|                     |  |
|---------------------|--|
| <b>Seat<br/>No.</b> |  |
|---------------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov - 2022**  
**COMPUTER SCIENCE (Paper – XV)**  
**Advanced Java**

Day & Date: Monday, 06-02-2023  
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) GenericServlet is a protocol dependent.  
a) True                                      b) False
- 2) \_\_\_\_\_ Method Returns the parameter value for the specified parameter name in web.xml.  
a) getInitParameter(String name)  
b) getParameter(String name)  
c) setInitParameter(String name)  
d) setParameter(String name)
- 3) Which of the following is not an attribute of <jsp:useBean> tag  
a) id                                          b) scope  
c) class                                        d) property
- 4) What type of error object is thrown from the <c:catch> tag?  
a) java.lang.error                          b) java.lang.exception  
c) java.lang.throwable                      d) all of these
- 5) Which character is used to represent an input parameter in a callableStatement?  
a) #                                              b) /  
c) &                                                d) ?
- 6) How many layer are available in hibernate architecture?  
a) 1                                                b) 4  
c) 3                                                d) 5
- 7) \_\_\_\_\_ method is used to perform DML statement in JDBC.  
a) executeResult()                            b) executeQuery()  
c) executeUpdate()                            d) Execute()
- 8) What are the advantages of spring framework?  
a) predefined template                      b) loose couple  
c) power abstraction                          d) all of these
- 9) Hibernate is a \_\_\_\_\_.  
a) CRM                                            b) ORM  
c) programming tool                          d) SQL tool

- 10) TLS stands for Tag library data.  
a) True                      b) False

**Q.1 B) Fill in the Blanks. 06**

- 1) CGI stands for \_\_\_\_\_.
- 2) \_\_\_\_\_ types of driver used in JDBC.
- 3) \_\_\_\_\_ XML file called a deployment descriptor.
- 4) The \_\_\_\_\_ action tag is used to forward the request to another resource it may be jsp, html or another resource.
- 5) \_\_\_\_\_ is an open source framework that extends the Java Servlet API and employs a Model, View, Controller (MVC) architecture.
- 6) \_\_\_\_\_ Text files stored on the client computer and they are kept for various information tracking purpose.

**Q.2 Answer the followings (Any Eight):** **16**

- 1) What is use of PreparedStatement?
- 2) What is Java Bean?
- 3) What is use of RequestDispatcher?
- 4) List out of advantages of Hidden form field.
- 5) List out: General purpose tag in JSP.
- 6) What is use of struts?
- 7) What is scriplet?
- 8) List out the techniques used for Session tracking.
- 9) List out implicit object used in JSP.
- 10) What is JDBC?

**Q.3 A) Answer the followings (Any two):** **10**

- 1) What are the features of Struts?
- 2) Explain custom tag in JSP with example.
- 3) Write a program to demonstrate the Prepared Statement.

**B) Explain servlet life cycle.** **06**

**Q.4 A) Answer the followings (Any two):** **08**

- 1) Explain collection mapping in hibernate in detail.
- 2) List out Difference between servlet and JSP.
- 3) What is cookies? Explain advantages of cookies.

**B)** Write a program to demonstrate use of jsp: forward action tag. **08**

**Q.5 Answer the following (Any Two).** **16**

- Explain Session tracking mechanism in servlet.
- Explain steps for JDBC connectivity with example.
- Explain Hibernate architecture.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper-XVI)**

**Atomic, Molecular Physics and Quantum Mechanics**

Day & Date: Tuesday, 07-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

**Q.1 A) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) X-rays are \_\_\_\_\_ waves.
  - a) Electromagnetic
  - b) mechanical
  - c) electric
  - d) longitudinal
- 2) In general, the electrons in a subshell have \_\_\_\_\_ spins.
  - a) parallel
  - b) antiparallel
  - c) opposite
  - d) zero
- 3) Spin quantum number always has the magnitude \_\_\_\_\_.
  - a) 1
  - b) 2
  - c) 0
  - d)  $\frac{1}{2}$
- 4) Electronic configuration of \_\_\_\_\_ is  $1s^2 2s^2 2p^6 3s^1$ .
  - a) Li
  - b) Na
  - c) K
  - d) Rb
- 5) The  $nP \rightarrow 2S$  transitions of principal series  $n > 2$  correspond to \_\_\_\_\_ series of *Li*.
  - a) diffuse
  - b) fundamental
  - c) sharp
  - d) principal
- 6) In alkali spectra, the selection rule for  $j$  in emission transitions is \_\_\_\_\_.
  - a)  $\Delta j = 0$
  - b)  $\Delta j = \pm 1$
  - c)  $\Delta j = 0, \pm 1$
  - d)  $\Delta j = 2$
- 7) If the coupling between  $l^*$  and  $s^*$  is broken in an external magnetic field, then we observe \_\_\_\_\_.
  - a) Anomalous Zeeman effect
  - b) Paschen-Back effect
  - c) Stark effect
  - d) Compton effect
- 8) The effect of electrical field on spectral lines is known as \_\_\_\_\_.
  - a) Zeeman effect
  - b) Paschen-Back effect
  - c) Raman effect
  - d) Stark effect
- 9) If wave function  $\Psi$  is imaginary then probability density is \_\_\_\_\_.
  - a) negative
  - b) a positive real quantity
  - c) positive
  - d) a negative real quantity

- 10) A moving particle of matter is always associated with \_\_\_\_\_.  
a) wave                      b) photon  
c) radiation                d) charge

**B) Fill in the blanks.**

06

- 1) d-state corresponds to  $l =$  \_\_\_\_\_.
- 2) Uncertainty in simultaneous measurement of position and momentum was given by \_\_\_\_\_.
- 3) The unit of Planck's constant is \_\_\_\_\_.
- 4) Maximum number of electrons present in the  $n^{\text{th}}$  shell is \_\_\_\_\_.
- 5) L-shell corresponds to  $n =$  \_\_\_\_\_.
- 6) The theory of matter waves was proposed by \_\_\_\_\_.

**Q.2 Solve any Eight of the following.**

16

- State the names of mechanical quantum numbers.
- Name the four series observed in Li and Na spectra.
- Give Zeeman splitting of Sodium D-lines with necessary energy level diagram.
- What is molecular bond? Give its types.
- What is Heisenberg's Uncertainty principle?
- Give the concept of matter waves.
- What is tunnel effect?
- What is an operator?
- Give the properties of Raman lines.
- Write a note on selection rules for alkali spectra.

**Q.3 A) Attempt any Two of the following.**

10

- 1) Write a note on Stark effect in Hydrogen. Explain strong field Stark effect in Hydrogen along with Selection rules.
- 2) Derive Schrodinger's time independent wave equation for a particle.
- 3) Obtain expression for,
  - i) Linear momentum operator
  - ii) Total energy operator

**B)** Write a note on Doublet fine structure of Alkali metals.

06

**Q.4 A) Attempt any Two of the following.**

08

- 1) What is Anomalous Zeeman effect? Draw vector atom model showing mechanical and magnetic moments of an atom in weak magnetic field. (Zeeman effect).
- 2) Obtain an expression for rotational energy of a diatomic molecule.
- 3) Write a note on electronic spectra of diatomic molecule. Write a note on Frank-Condon principle.

**B)** What is linear harmonic oscillator? Derive an expression for its energy levels. Explain zero point energy.

08

**Q.5 Attempt any Two of the following.**

16

- Explain Raman effect. What are Stoke's and Anti-Stoke's lines? Give the classical theory of Raman effect.
- Show that  $[L_x, L_y] = i \hbar L_z$
- Obtain Schrodinger's wave equation for hydrogen atom in terms of spherical polar coordinates. Obtain expression for its radial and angular parts.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Special Paper - XV)**  
**Organic Chemistry**

Day & Date: Tuesday, 07-02-2023  
 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.  
 4) Draw neat labelled diagrams wherever necessary.

**Q.1 A) Choose the most correct alternative from those given below. 10**

- 1) Pyrrole is \_\_\_\_\_ in nature.
 

|               |            |
|---------------|------------|
| a) acidic     | b) basic   |
| c) amphoteric | d) neutral |
- 2) Pyrrole gives electrophilic substitution reactions preferentially at \_\_\_\_\_.
 

|      |      |
|------|------|
| a) 1 | b) 2 |
| c) 3 | d) 6 |
- 3) Molecular formula of vitamin A is \_\_\_\_\_.
 

|                    |                      |
|--------------------|----------------------|
| a) $C_{20}H_{40}O$ | b) $C_{20}H_{44}$    |
| c) $C_{20}H_{30}O$ | d) $C_{20}H_{30}O_2$ |
- 4) Drugs used to lower the body temperature are called as \_\_\_\_\_.
 

|                |               |
|----------------|---------------|
| a) antibiotic  | b) antifungal |
| c) antipyretic | d) anesthetic |
- 5) Chloromycetin is a \_\_\_\_\_ rotatory antibiotic.
 

|            |                  |
|------------|------------------|
| a) dextro  | b) laevo         |
| c) racemic | d) none of these |
- 6) \_\_\_\_\_ is an anticancer drug.
 

|                 |                |
|-----------------|----------------|
| a) Ethambutol   | b) Tolbutamide |
| c) Chlorambucil | d) Paludrin    |
- 7) Acidic dye is an example of \_\_\_\_\_ dye.
 

|                  |                    |
|------------------|--------------------|
| a) water soluble | b) water insoluble |
| c) reactive      | d) Ingrain         |
- 8) \_\_\_\_\_ stimulates latex production in rubber trees.
 

|                         |             |
|-------------------------|-------------|
| a) Carbamate            | b) Ethophan |
| c) Indole 3 acetic acid | d) Baygon   |
- 9) The chemicals used to control weeds are called as \_\_\_\_\_.
 

|                 |                 |
|-----------------|-----------------|
| a) Insecticides | b) herbicides   |
| c) fungicides   | d) rodenticides |
- 10) Which of the following is a non-reducing sugar?
 

|             |                      |
|-------------|----------------------|
| a) sucrose  | b) glucose           |
| c) fructose | d) None of the above |



**B) Fill in the blanks.****06**

- 1) The pentacyclic ring containing one nitrogen hetero atom is called as \_\_\_\_\_.
- 2) Beta carotene is the provitamin for vitamin \_\_\_\_\_.
- 3) Skraup's synthesis is used to prepare \_\_\_\_\_.
- 4) Vitamin-A is also known as \_\_\_\_\_.
- 5) The relationship between colour and constitution was pointed out by scientist \_\_\_\_\_.
- 6) Sucrose on hydrolysis produces \_\_\_\_\_ and \_\_\_\_\_.

**Q.2 Solve any Eight of the following.****16**

- a) Write any two objections to open chain structure of D-glucose.
- b) Define mutarotation.
- c) Draw the structure of thyroxine.
- d) Give two examples of fat soluble and water-soluble vitamins.
- e) Define CNS drugs with example.
- f) Define carbohydrates with example.
- g) What is used as synergist in pyrethroid?
- h) What are dyes? Give qualities of a good dye.
- i) Which acid will be produced on the ozonolysis of vitamin-A?
- j) Why pyridine is more basic than Pyrrole?

**Q.3 A) Attempt any Two of the following.****10**

- 1) What are Agrochemicals? Give synthesis and uses of Indole 3 acetic acid.
- 2) Define chromophore and auxochrome.  
Classify following functional groups into chromophore and auxochrome.  
-OH, -NH<sub>2</sub>, C=O, C=C, -CN, -C=S
- 3) Explain the classification of dyes based on the mode of application of dyes.

**B) Define hormones with example. Give synthesis of adrenaline.****06****Q.4 A) Attempt any Two of the following.****08**

- 1) Write synthesis and use of methoxychlor.
- 2) Give any two methods of preparation of pyrrole.
- 3) Give the synthesis and uses of Phenolphthalein.

**B) Define polysaccharides? Write structural formulae and uses of the following:****08**

- 1) Starch
- 2) Cellulose
- 3) Lactose

**Q.5 Attempt any Two of the following.****16**

- a) What are heterocyclic compounds? Give anyone method of preparation of pyridine. What is action of following on pyridine?
  - 1) KNO<sub>3</sub>/ H<sub>2</sub>SO<sub>4</sub>, 300° C
  - 2) SO<sub>3</sub>/ H<sub>2</sub>SO<sub>4</sub>
  - 3) Br<sub>2</sub>/ charcoal
  - 4) NaNH<sub>2</sub>/100°C
- b) Write synthesis of vitamin-A. Discuss the analytical evidences putforth in the support of the structure of vitamin-A.
- c) What are drugs? What are the qualities of an ideal drug? Discuss synthesis and uses of Ibuprofen.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**Botany (Special Paper - XV)**  
**Cell Biology**

Day & Date: Tuesday, 07-02-2023  
 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 logarithmic table and calculator is allowed.

**Q.1 A) Rewrite the following question choosing correct alternative. 10**

- 1) When the power of ocular lens is 10 X and objective lens is 20X, the magnification is \_\_\_\_\_.  
 a) 30 times                                      b) 20 times  
 c) 200 times                                     d) 2000 times
- 2) Electron Microscope can give a magnification up to \_\_\_\_\_.  
 a) 400,000X                                      b) 100,000X  
 c) 15000 X                                        d) 100 X
- 3) The components of prokaryotic cells are \_\_\_\_\_.  
 a) plasma membrane                        b) DNA  
 c) cytoplasm                                     d) All of these
- 4) \_\_\_\_\_ organelle present in Eukaryotic cell.  
 a) Nucleus                                        b) Mitochondria  
 c) Golgi apparatus                            d) Chloroplast
- 5) \_\_\_\_\_ activities are characteristics of organelle peroxisomes.  
 a) Dehydrogenase                            b) Catalase  
 c) Remove of hydrogen                    d) All of these
- 6) Ion carriers are located in cell \_\_\_\_\_.  
 a) Plasma membrane                        b) Cell wall  
 c) Nucleus                                        d) Cellular space
- 7) The term chromosome was first coined by \_\_\_\_\_.  
 a) Sutton                                          b) Boveri  
 c) Waldeyer                                      d) Hoffmeister
- 8) \_\_\_\_\_ types of chromosomes are divide on the basis of position of centromere.  
 a) 4                                                    b) 2  
 c) 3                                                    d) 6
- 9) \_\_\_\_\_ is longest stage in the cell cycle.  
 a) Inter phase                                    b) Ana phase  
 c) Meta phase                                    d) None of the above
- 10) Chromosome structure can be observed best during \_\_\_\_\_.  
 a) Ana phase                                      b) Meta phase  
 c) Telophase                                      d) None of the above

**B) Fill in the blank / Definition / one sentence answer /one word answer / 06  
give the name / predict the product.**

- 1) Give the Definition of Mitosis?
- 2) The chromosome number in Meiosis, Tellophase-II is \_\_\_\_\_.
- 3) \_\_\_\_\_ organelles is called the power house of cell.
- 4) Which Microscope is used, to study the ultra structure of cell organelles?
- 5) The genes are present in \_\_\_\_\_ structure.
- 6) Which organelles is trap the light photons?

**Q.2 Solve any Eight of the following. 16**

- a) What is mean by Microscope?
- b) What is mean by prokaryotic cell?
- c) Sketch and label the Metacentric chromosome.
- d) Give the functions of Lysosome.
- e) Sketch and label the cell wall.
- f) Give the significance of Mitosis.
- g) Give the any four principles of microscopy.
- h) Give the principle of phase contrast microscope.
- i) Write the any four dis tinging wishing character of Eukaryotic cell.
- j) Write the characteristic of Y, chromosome.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Give the advantage and application of phase contrast microscope.
- 2) What is prokaryotic cell and give components of its?
- 3) Describe the importance and uses of mitosis.

**B) What are the four types of chromosome? 06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) Write the sample preparation for Electron Microscope.
- 2) Write on the ultra structure of chloroplast and its function.
- 3) Write short note on telophase of mitosis.

**B) What is cell cycle? write the note on significance of cell cycle. 08**

**Q.5 Attempt any Two of the following. 16**

- a) Write the construction, principle and use of Scanning Electron Microscope.
- b) Explain the different models of cell membrane.
- c) Describe the stages of meiosis -I with labelled diagram.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|       |
|-------|
| Set P |
|-------|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Special Paper- XV)**  
**Animal Behavior and Chronobiology**

Day & Date: Tuesday, 07-02-2023  
 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 logarithmic table and calculator is allowed.  
 4) Draw a neat labelled diagram whenever necessary.

**Q.1 A) Fill in the blanks by choosing correct alternatives given below. 10**

- 1) Promiscuous sexual selection is for \_\_\_\_\_.  
 a) coming together                      b) producing young ones  
 c) leaving out                              d) all the above
- 2) In the male rivalry \_\_\_\_\_ types of offspring's are formed.  
 a) dominant and best                      b) bad young's  
 c) poor                                        d) recessive
- 3) Trophism is found in \_\_\_\_\_.  
 a) plants                                      b) cat  
 c) monkey                                    d) elephant
- 4) In inter sexual selection \_\_\_\_\_ shows specific characters.  
 a) male                                        b) female  
 c) chickens                                  d) dominant male
- 5) \_\_\_\_\_ behaviour is stimulated through the life.  
 a) mimicry                                    b) experienced  
 c) stereotype                                d) all the above
- 6) \_\_\_\_\_ term was proposed by F Hallberg.  
 a) Pharmacology                            b) Osteology  
 c) Ecology                                    d) Chronobiology
- 7) In circannual rhythm certain activities are repeated by \_\_\_\_\_.  
 a) five                                         b) seven  
 c) year by year                              d) one
- 8) In males fighting is done for \_\_\_\_\_ purpose.  
 a) feeding                                     b) mating  
 c) watering                                  d) sheltering
- 9) Learning behaviour involves \_\_\_\_\_ experience.  
 a) new                                         b) old  
 c) previous                                  d) confusing
- 10) Imprinting learning behaviour is only found in \_\_\_\_\_.  
 a) adult                                        b) male  
 c) female                                      d) only in just borned

**B) Fill in the blanks/ Definition/ one sentence answer/ one word answer/ give the name/predict the product etc. 06**

- 1) Poly androus condition is found in \_\_\_\_\_ individual.
- 2) Define the term circadian rhythm.
- 3) In waggle dance worker shows which type of figure is seen?
- 4) When Pavlov rangs the bell what is seen in his dog?
- 5) In aggressive behaviour which hormone is released?
- 6) In which class of vertebrates both the parents takes care of their eggs?

**Q.2 Solve any Eight of the following. 16**

- a) What is the purpose of foraging in animals?
- b) What is mean by sexual dimorphism in animals?
- c) What is tidal rhythm?
- d) What is associate learning behaviour in animals?
- e) What is Lunar rhythms?
- f) Give significance of biological clocks.
- g) What is Chronotherapy?
- h) Role of melatonin in biological clock.
- i) What is inter -sexual selection?
- j) Describe types biological rhythms.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Describe types of sexual behaviours in animals.
- 2) What is concept of society specially in honey bees?
- 3) What is photo period and regulation?

**B) Short notes/solve. 06**

Give the brief profile of Karl Von Frish.

**Q.4 A) Attempt any Two of the following. 08**

- 1) Describe purpose of scent marking in various animals.
- 2) Describe in detail chronobiology.
- 3) What is chrono-medicine and its use?

**B) Describe / Explain /solve 08**

Explain the role of males in sexual behaviour in different animals, Give suitable example.

**Q.5 Attempt any Two of the following. 16**

- a) Wheat is Chrono-pharmacology and its role in various diseases.
- b) Describe classical and operant conditioning behaviour.
- c) Describe various types of sexual selection in various animals.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|       |
|-------|
| Set P |
|-------|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Special Paper- XV)**  
**GRAPH THEORY**

Day & Date: Tuesday, 07-02-2023  
 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 by choosing correct alternatives given below. 10**

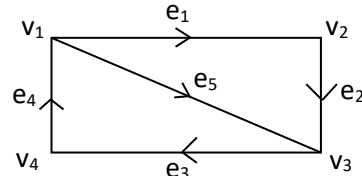
- 1) If  $e = (u, v)$  is edge in a diagram then  $u$  is called as \_\_\_\_\_.  
 a) isolated vertex                      b) terminal vertex  
 c) initial vertex                         d) None of these
- 2) A vertex is called pendant if and only if it has a degree \_\_\_\_  
 a) 0                                              b) 1  
 c) 2                                              d) 3
- 3) In pseudograph \_\_\_\_ are allowed.  
 a) only loop                                  b) only multiple edges  
 c) both loops and multiple edges      d) neither loop nor multiple edges
- 4) Repeated vertex is not allowed in \_\_\_\_  
 a) walk                                         b) trail  
 c) circuit                                        d) path
- 5) If plane graph has  $k$  components, then  $n - e + r =$  \_\_\_\_  
 a)  $K$                                               b)  $K+1$   
 c)  $K - 1$                                         d)  $K^2+1$
- 6) Complete graph  $K_n$  is Eulerian if  $n =$  \_\_\_\_  
 a) 2                                                b) 4  
 c) 5                                                d) 6
- 7) A tree with  $n$  vertices has \_\_\_\_\_ edges.  
 a)  $n + 1$                                         b)  $n - 1$   
 c)  $n$                                                 d)  $n^2$
- 8) A tree with \_\_\_\_\_ vertex is called a trivial tree.  
 a) one                                              b) two  
 c) three                                            d) four
- 9) The binary number  $1010101111_{(2)}$  is equivalent to octal number \_\_\_\_\_.  
 a)  $2537_{(8)}$                                       b)  $2357_{(8)}$   
 c)  $2735_{(8)}$                                       d)  $2573_{(8)}$
- 10) Convert  $9719_{(10)}$  to Hexadecimal is \_\_\_\_\_.  
 a)  $255F_{(16)}$                                     b)  $25F7_{(16)}$   
 c)  $2F57_{(16)}$                                     d)  $2F75_{(16)}$

**B) Give answer of following.**

**06**

- 1) Convert the number  $10110100101110_{(2)}$  to Hexadecimal
- 2) Draw complete Bipartite graph  $K_{2,3}$
- 3) Draw a cycle  $C_6$

- 4) Write incidence matrix of

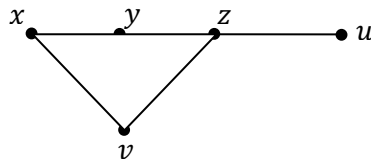


- 5) Define planner graph.  
6) Draw tree on three vertices.

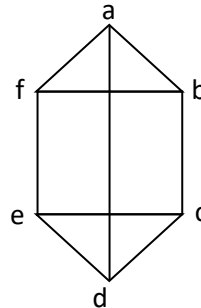
**Q.2 Attempt any eight of the following.**

16

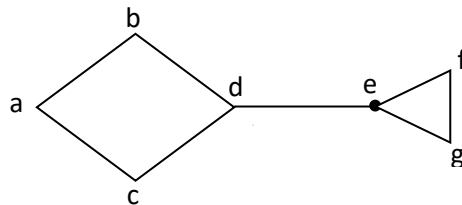
- 1) Convert  $684_{(10)}$  in quintal.  
2) Convert  $626_{(10)}$  to base 4.  
3) Find deg of each vertex.



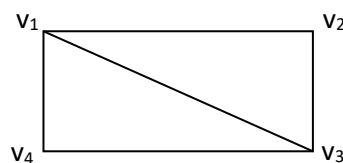
- 4) Define Complete and Regular graph.  
5) Find any two sub graph of



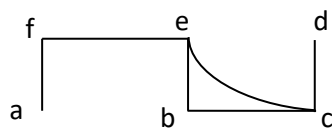
- 6) Find diameter of graph.



- 7) Write Adjacency matrix of graph.



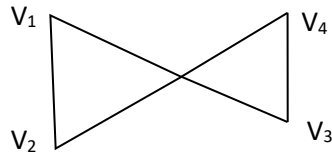
- 8) Show that in a complete  $n$  - ary tree with ' $i$ ' internal vertices the number of leaf vertex  $P$  is given by  $P = \frac{(n-1)(x-1)}{n}$   
9) Find spanning tree of



- 10) Draw binary tree represent of  $(a + b) * c/d$

**Q.3 A) Attempt any two of the following.**

- 1) What is size of  $r$  regular  $(p, q)$  graph? Does there exist four regular graph on six vertices? If so construct it.
- 2) Find number of walk of length 3 from  $V_2$  to  $V_4$  and also check the connectedness of graph.



- 3) A simple graph  $G$  has a spanning tree if and only if  $G$  is connected.

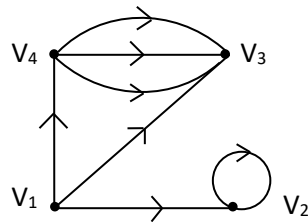
**B) Convert hexadecimal to decimal system  $73D5_{(16)}$  and also convert decimal from hexadecimal  $39 \cdot B8$** 

06

**Q.4 A) Attempt any two of the following.**

08

- 1) Write prefix and postfix from the expression  $A * B - C \uparrow D + E/F$  also represent the expression as a binary tree.
- 2) Show that a simple graph with  $n$  vertices and  $K$  components can not have more than  $\frac{(n-K)(n-K+1)}{2}$  edges.
- 3) Find in degree out degree and total degree of each vertex of following graph.

**B) Convert :**

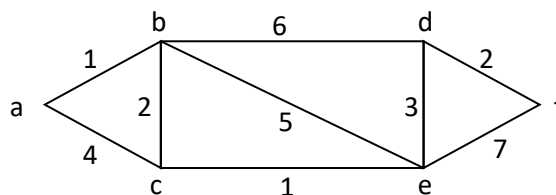
08

- i)  $111.1101_{(2)}$  to decimal
- ii)  $\log_{(10)}$  to binary
- iii)  $1010101111_{(2)}$  to Hexadecimal
- iv)  $33.24_{(8)}$  to binary

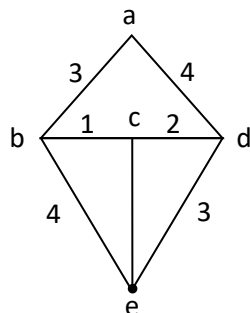
**Q.5 Answer the following questions. (Any two)**

16

- 1) Apply Dijkstra's algorithm to find the shortest path between the indicated vertices in the given weighted graph from  $a$  to  $f$ .

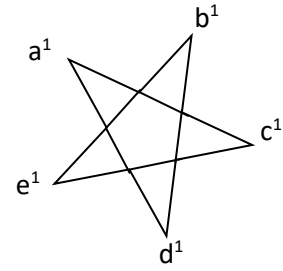
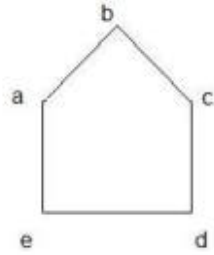


- 2) By using Kruskal's algorithm, find M.S.T. of graph

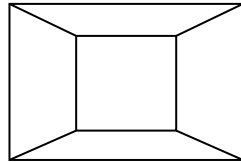




- 3) a) Show that following graphs are isomorphic.



- b) Verify Euler's formula for graph.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper- XV)**  
**Designs of Experiments**

Day & Date: Tuesday, 07-02-2023  
 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 from the following.** 10

- 1) The expected value of error component in a design of experiment is assumed to be
 

|      |           |
|------|-----------|
| a) 1 | b) 2      |
| c) 0 | d) 0 or 1 |
- 2) In RBD with error d.f. 12, with 4 blocks the required number of treatment would be
 

|      |      |
|------|------|
| a) 5 | b) 4 |
| c) 6 | d) 3 |
- 3) In CRD with 5 treatments, d.f. for treatment sum of squares is
 

|      |      |
|------|------|
| a) 3 | b) 4 |
| c) 5 | d) 6 |
- 4) The total number of interaction effects in  $2^2$  factorial experiment is
 

|      |      |
|------|------|
| a) 3 | b) 4 |
| c) 1 | d) 2 |
- 5) Replication in an experiment means:
 

|                                           |
|-------------------------------------------|
| a) The number of treatments               |
| b) The number of blocks                   |
| c) The number of times a treatment occurs |
| d) None of these                          |
- 6) In CRD with K treatments, the d.f. for treatment is
 

|        |                |
|--------|----------------|
| a) N-K | b) N-1         |
| c) K-1 | d) (N-K) (K-1) |
- 7) Which of the following is principle of design of experiment?
 

|                  |                 |
|------------------|-----------------|
| a) Randomization | b) Replication  |
| c) Local control | d) All of these |
- 8) The method confounding is a device to reduce the size of
 

|               |                  |
|---------------|------------------|
| a) Experiment | b) Replication   |
| c) Blocks     | d) None of these |
- 9) A medicine is a treatment applied to
 

|                   |                  |
|-------------------|------------------|
| a) A patient      | b) A field plot  |
| c) Both a) and b) | d) None of these |
- 10) If different effects are confounded in different replicates, it is said to be
 

|                         |                         |
|-------------------------|-------------------------|
| a) Complete confounding | b) Balanced confounding |
| c) Partial confounding  | d) None of these        |

**B) Attempt all of the following****06**

- 1) Define a treatment.
- 2) Define experimental unit.
- 3) Define efficiency of design of experiment.
- 4) State mathematical model used in CRD.
- 5) Define replication in design of experiment.
- 6) Define yield.

**Q.2 Attempt any eight of the following.****16**

- a) State main effects in a  $2^2$  factorial experiment.
- b) Explain principle of randomization.
- c) State the mathematical model used in RBD
- d) Explain partial confounding.
- e) Give two merits of CRD.
- f) State formula to estimate one missing observation in Latin square Design.
- g) Define layout of an experiment.
- h) Give the formula for efficiency of RBD over CRD.
- i) Explain split-plot design.
- j) Define concomitant variable in ANOCOVA.

**Q.3 A) Attempt any two of the following:****10**

- 1) What is Latin square design? Give its layout.
- 2) Describe in brief two principles of design of experiments; replication and local control.
- 3) Explain the procedure of testing equality of two treatment means in case of RBD.

**B) Estimate the parameters in RBD****06****Q.4 A) Attempt any two of the following.****08**

- 1) Derive the formula for estimating efficiency of LSD over RBD when rows are taken as blocks.
- 2) What is meant by the main effect and interaction effect in a  $2^2$  factorial experiment? Derive the expression for interaction effect.
- 3) State mathematical model, assumptions and analysis of variance (ANOVA) table in case of CRD.

**B) Explain yate's procedure to obtain factorial effect totals in a  $2^3$  factorial experiment.****08****Q.5 Attempt any two of the following.****16****a) Complete the following ANOVA table in LSD**

| Source of variation | d.f. | S.S. | M.S.S. | F |
|---------------------|------|------|--------|---|
| Rows                | -    | 72   | -      | 2 |
| Columns             | -    | -    | 36     | - |
| Treatments          | -    | 180  | -      | - |
| Error               | 6    | -    | 12     | - |
| Total               | -    | -    |        |   |

- b) Give mathematical model, assumptions and Analysis of Variance table in case of RBD.
- c) Give the statistical analysis of split plot design.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**GEOLOGY (Special Paper – XV)**  
**Environmental Geology**

Day & Date: Tuesday, 07-02-2023  
 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) Choose the appropriate answer from the given option. 10**

- 1) Sinkhole collapse subsidence in karst areas commonly occurs because which reason?
  - a) collapse of cavern roofs
  - b) collapse of surface materials over a cavity
  - c) rapid solution of limestone near the surface
  - d) all of these reasons given in a, b & c
- 2) The solid material falls down under influence of gravity in which hazard?
  - a) cyclone,
  - b) Tsunami
  - c) Landslide
  - d) volcano
- 3) Head of district level disaster management team is, \_\_\_\_\_.
  - a) collector
  - b) prime minister
  - c) chief minister
  - d) home minister
- 4) Which symptom is associated with the hazard of volcanoes?
  - a) rise in groundwater temperature
  - b) water breaking the limits of banks
  - c) violent sea waves
  - d) heavy rain
- 5) Building the strong foundation of structures is part of preparedness for which hazard mainly?
  - a) Earthquake
  - b) Tsunami
  - c) Landslide
  - d) Volcano
- 6) Process of cut-off of photosynthesis may cause drought due to which product of volcano?
  - a) volcanic bomb
  - b) ash
  - c) lava
  - d) mud
- 7) The most destructive landslides generally occur on which type of slope?
  - a) gentle slopes
  - b) intermediate slopes
  - c) steep slopes
  - d) leveled ground
- 8) What percent of the total water available is potable?
  - a) 10
  - b) 5
  - c) 15
  - d) 3

- 9) Gas masks are used in which disasters?  
a) Cyclone                      b) Tsunami  
c) Landslide                  d) Volcano
- 10) Channel spreading & artificial levee are control measures for which hazard?  
a) Flood                        b) Tsunami  
c) Landslide                  d) volcano

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ 06**  
**Give the name/Predict the product etc.**

- 1) Define Retention Wall.
- 2) Define Avalanche.
- 3) What is the name of a volcanic hazard where mud flows down slopes?
- 4) Which life supporting gas increased in the atmosphere in due course of its evolution?
- 5) Give the name of the region of India where avalanches are common.
- 6) What can be the exploding product of volcanic eruption?

**Q.2 Answer any Eight of the following. 16**

- Give two examples of global scale disasters.
- Give examples of any two man made disasters.
- With reference to flood, if green cover is removed what will be its effect on infiltration?
- With reference to landslide, if green cover is removed; how will it affect the landslide?
- What are two main purposes of dam construction?
- What has caused subsidence in Shanghai?
- In which condition of beds dipping in relation to slope direction; landslide will be less possible?
- What are two preparedness measures for COVID 19 pandemic?
- What percentage of sun energy is reflected back from earth's atmosphere?
- What is the percentage of water trapped in the form of ice on the earth surface?

**Q.3 A) Attempt any Two of the following. 10**

- 1) Describe the lithosphere and the processes involved in.
- 2) Describe the water cycle of Hydrosphere.
- 3) Describe the Biosphere of the earth.

|                            |           |
|----------------------------|-----------|
| <b>B) Short note/Solve</b> | <b>06</b> |
|----------------------------|-----------|

Describe the process of energy distribution of the sun on the earth. Add note on reflected energy interaction with the atmosphere.

**Q.4 A) Attempt any Two of the following. 08**

- 1) Describe the difference between climate and the weather with examples.
- 2) Describe the role of humans in climate change of the atmosphere.
- 3) Describe the preparedness for volcanic disaster.

**B) Describe the interaction of Lithosphere and atmosphere. Add note on the relevant process that causes drought. 08**

**Q.5 Attempt any Two of the following.**

- a) Describe the structure of the atmosphere. Add note on the greenhouse effect.
- b) Describe the nature of interaction of Lithosphere & Biosphere. Add note on anthropogenic impact on this interaction process.
- c) Describe the nature of interaction of Hydrosphere & Biosphere. Add note on anthropogenic impact on this interaction process.

**Seat  
No.**

## Max. Marks: 80

Page 1 of 2

**B) Fill in the blank/ Definition/ One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**

- 1) Define 'Chemotherapy'.
- 2) Define 'Pathogenicity'.
- 3) Enlist all chemotherapeutic agents that inhibit protein synthesis.
- 4) Enlist all chemotherapeutic agents that inhibit cell wall synthesis.
- 5) Give the significance of the vaccine.
- 6) Enlist all COVID-19 vaccines.

**Q.2 Solve any Eight of the following. 16**

- a) What is microbial adhesion?
- b) Give examples of any two fungal diseases.
- c) Enlist all bacterial toxins.
- d) Enlist ideal characteristics of biological weapons.
- e) Give the name of the pathogen is a major cause of dental disease.
- f) What is microbial invasion?
- g) Enlist any four ideal characteristics of the chemotherapeutic agent.
- h) What is antibiotic resistance?
- i) Give the two names of chemotherapeutic drugs acting on folic acid synthesis.
- j) Enlist all tests to guide chemotherapy.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Explain the mechanism of bacterial invasion.
- 2) Describe the mode of action of streptomycin.
- 3) Describe the mode of action of penicillin.

**B) Write a short note on the mechanism of antibiotic resistance. 06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) Explain recombinant vaccine.
- 2) Explain the mechanism of pathogenicity of viral infections.
- 3) Describe the various characteristics of bioweapons.

**B) Describe in detail modes of transmission, pathogenesis, symptoms, and laboratory diagnosis of AIDS disease. 08**

**Q.5 Attempt any Two of the following. 16**

- a) What are beta-lactam antibiotics? Give a detailed account of the mode of action of penicillin.
- b) Enlist all biomedical wastes and explain in detail biomedical waste management.
- c) Discuss in detail modes of transmission, pathogenesis, symptoms, and treatment of leprosy disease.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|       |
|-------|
| Set P |
|-------|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**ELECTRONICS (Special Paper- XV)**  
**Electronics Instrumentation**

Day & Date: Tuesday, 07-02-2023  
 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.  
 4) Draw a neat labelled diagram whenever necessary.

**Q.1 A) Multiple choice questions.**

**10**

- 1) The grounding and shielding techniques are used to reduce \_\_\_\_\_.  
 a) Power consumption                      b) Noise in the circuit  
 c) Cost and size                                d) Signal level
- 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) In case of DMM, to measure the value of unknown resistance the \_\_\_\_\_ source is utilized.  
 a) constant voltage                              b) constant current  
 c) variable voltage                                d) variable current
- 5) The standard glass pH electrode is of \_\_\_\_\_ electrode.  
 a) potentiometric                                b) Ampeometric  
 c) variable capacitive                              d) variable inductive
- 6) In case of CRO, the delay line circuit is introduced in \_\_\_\_\_ channel.  
 a) horizontal                                      b) Vertical  
 c) dual                                                d) none of these
- 7) The AD594/595 is precalibrated precision amplifier to produce output voltage \_\_\_\_\_ from thermocouple signal.  
 a) 1 mV/ $^{\circ}$ C                                      b) 10 $\mu$ V/ $^{\circ}$ C  
 c) 10 mV/ $^{\circ}$ C                                      d) 1 $\mu$ V/ $^{\circ}$ C
- 8) The \_\_\_\_\_ method is employed in magnetic tape recording.  
 a) direct recording                                b) frequency modulation  
 c) pulse code modulation                              d) all of these
- 9) The frequency generator utilizes \_\_\_\_\_ to produce the frequency.  
 a) Integrator                                      b) differentiator  
 c) both a and b                                      d) amplifier
- 10) The programmable instrumentation amplifier has \_\_\_\_\_.  
 a) low offset voltage                                b) low offset voltage drift  
 c) low noise                                        d) all of these

**B) Give One sentence answer. 06**

- 1) List the names of display units.
- 2) Give Salient features of Programmable Instrumentation amplifier.
- 3) What is chopper amplifier?
- 4) Which is the most popular liquid crystal structure used in LCD?
- 5) List out the basic components of a Magnetic recorder.
- 6) What is Data Acquisition System?

**Q.2 Solve any Eight of the following. 16**

- a) Draw the block diagram of Conductivity meter.
- b) Draw block diagram of DC signal conditioning system.
- c) State the applications of IC AD 620.
- d) What is the role of preamplifier in signal conditioning?
- e) Give the advantages of instrumentation amplifier.
- f) Give the objectives of data acquisition system.
- g) Write the role of proper grounding of the circuit.
- h) Distinguish between LED and LCD.
- i) What is Isolation amplifier?
- j) Draw block diagram of digital multimeter.

**Q.3 A) Attempt any Two of the following. 10**

- 1) What is signal conditioning? Explain the basic elements of the signal conditioning system.
- 2) Explain digital data recorder.
- 3) Write a note on LCR-Q meter.

**B) Write a note on Function generator. 06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) Explain X-Y recorder.
- 2) Explain the bridge amplifier for signal conditioning.
- 3) Explain the 4-20 mA current transmission.

**B) Draw the block diagram and explain the working of each block of CRO. 08**

**Q.5 Attempt any Two of the following. 16**

- a) Explain the working of digital storage oscilloscope with the help of block diagram
- b) Explain the data logger system in details.
- c) Describe general Data acquisition system with block diagram and explain the multichannel DAS.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Tuesday, 07-02-2023  
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.

## 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
- 9) In \_\_\_\_\_ transmission, the channel capacity is shared by both communicating devices at all time.  
a) Simplex                      b) Half-duplex  
c) Full-duplex                 d) None of the above
- 10) Which of the following layer of OSI model also called end-to-end layer?  
a) Presentation layer        b) Network layer  
c) Session layer               d) Transport layer

**B) Fill in the blank. 06**

- 1) The packet of information at the application layer is called \_\_\_\_\_.
- 2) \_\_\_\_\_ provides a connection-oriented reliable service for sending messages.
- 3) In the OSI model, encryption and decryption are functions of the \_\_\_\_\_ layer.
- 4) As frequency increases, the period \_\_\_\_\_.
- 5) \_\_\_\_\_ is a set of rules that governs data communication.
- 6) DNS is the abbreviation of \_\_\_\_\_.

**Q.2 Solve any Eight of the following. 16**

- a) Define Computer Network. And what are the benefits of the networks?
- b) Define the term half-duplex and full-duplex.
- c) What are the different transmission media?
- d) Define Analog and Digital signal.
- e) What is Attenuation?
- f) Define the term Multiplexing.
- g) Define Parity Check.
- h) What do mean by congestion control?
- i) Define the term Period and Phase.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Explain the Connection oriented and connection less services in data Communication.
- 2) Describe Manchester and Differential Manchester scheme.
- 3) Define Network devices? Explain Hub and Switch.

**B) Short note on TCP and UDP. 06****Q.4 A) Attempt any Two of the following. 08**

- 1) Explain Fiber Optic Cable transmission media.
- 2) Differentiate packet switching and circuit switching.
- 3) Explain the Point to Point Protocol in detail.

**B) Explain ISO- OSI Reference Model in detail with suitable diagram. 08****Q.5 Attempt any Two of the following. 16**

- a) Briefly explain the different data transmission modes: Parallel and Serial.
- b) Explain the TCP/IP protocol suite with SMTP, HTTP and SNMP.
- c) Briefly explain the CSMA/CD method with neat diagram.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Paper-XVII)**  
**Electronics**

Day & Date: Wednesday, 08-02-2023  
 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 tables and calculator is allowed.

**Q.1 A) Choose correct alternatives**

**10**

- 1) The feedback path in an OP-Amp differentiator consists of a \_\_\_\_\_.  
 a) Capacitor  
 b) Resistor  
 c) Resistor and an inductor.  
 d) Resistor and a capacitor in series.
- 2) An inverting amplifier has  $R_2 = 3 \text{ M}\Omega$  and  $R_1 = 3 \text{ K}\Omega$ . Its gain is \_\_\_\_\_.  
 a) -1000  
 b) 1000  
 c) 10  
 d) -10
- 3) OP-AMP performs \_\_\_\_\_ operations.  
 a) Arithmetic  
 b) Logical  
 c) Alphanumeric  
 d) Both a) and b)
- 4) The Pin 6 of IC555 is \_\_\_\_\_.  
 a) Control Voltage  
 b) Threshold  
 c) Ground  
 d) Vcc
- 5) SCR is a \_\_\_\_\_ type of device.  
 a) Thyristor  
 b) Resistor  
 c) Capacitor  
 d) Diode
- 6) An SCR Combines the features of a rectifier and \_\_\_\_\_.  
 a) Resistor  
 b) Transistor  
 c) Capacitor  
 d) Inductor
- 7) A DIAC has \_\_\_\_\_ semiconductor layers.  
 a) One  
 b) Two  
 c) Three  
 d) Four
- 8) \_\_\_\_\_ is passive display.  
 a) LCD  
 b) LED  
 c) CRT  
 d) Gas Discharge Plasma
- 9) In gas discharge plasma displays, cold cathode numerical indicators are called \_\_\_\_\_.  
 a) Anode  
 b) Cathode  
 c) Gate  
 d) Nixies

- 10) An n-Channel D-MOSFET with a positive  $V_{GS}$  is operating in \_\_\_\_\_.  
 a) Cutoff                                      b) Enhancement mode  
 c) Depletion mode                              d) Saturation

**B) Give the answers in one sentence/one word of the following. 06**

- 1) How many pins do The IC555 timer consist of?
- 2) At what condition does SCR turn off?
- 3) How many minimum thyristors are required to make a TRIAC?
- 4) Which material is used to give a green colour in LED?
- 5) In which region FET should be operated as a voltage variable resistor?
- 6) What is the bandwidth of an ideal operational amplifier?

**Q.2 Solve any eight of the following:** **16**

- Draw the block diagram of OP-AMP
- If monostable mode of IC555 consists of  $R=1\text{ M}\Omega$  and  $C=47\mu\text{F}$  then find the value of time period monostable multivibrator.
- Give two methods used for D-MOSFET biasing.
- Write transconductance of D-MOSFET.
- Give any four commonly used displays in digital electronics field.
- State different types of liquid crystals used for LCD display.
- Draw the symbol of DIAC and TRIAC.
- State the important applications of TRIAC.
- Define Breakover voltage and Holding current.
- Draw equivalent circuit of SCR.

**Q.3 A) Attempt any two of the following:** **10**

- 1) Explain OP-AMP as a differentiator.
- 2) Explain IC555 as a square wave generator.
- 3) Give important features of LCD.

**B) Write a short note on** **06**

- 1) IC555as Astable Multivibrator.

**Q.4 A) Attempt any two of the following:** **08**

- 1) Explain circuit operation of n-channel D-MOSFET.
- 2) What are the advantages of LED?
- 3) Explain the construction and working of DIAC.

**Q.4 B) Solve.** **08**

An OP-AMP is used in non-inverting mode with  $R_1 = 1\text{K}\Omega$  and  $R_2 = 10\text{K}\Omega$ .  $V_{CC} = \pm 12\text{V}$ . Calculate the output voltage for the following inputs

- 1)  $V_i = 100\text{mV}$
- 2)  $V_i = 5\text{V}$

**Q.5 Attempt any two of the following. 16**

- Explain the construction and working of a SCR.
- Give comparison between JFET and D-MOSFET.
- Explain with a diagram the operation of a seven segment display using gaseous discharge.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Special Paper – XVI)**  
**Analytical and Industrial Organic Chemistry**

Day & Date: Wednesday, 08-02-2023  
 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.  
 4) Draw neat labelled diagrams wherever necessary.

**Q.1 A) Multiple choice questions.****10**

- Polymers synthesized using two or more types of monomers are called as \_\_\_\_\_.  
 a) homopolymers                      b) graft polymers  
 c) natural polymers                  d) heteropolymers
- A linear polymer of 1,3 butadiene is formed when \_\_\_\_\_ polymerization takes place.  
 a) 1,2                                      b) 1,1  
 c) 1,3                                      d) 1,4
- Bio-catalytic reactions are carried out by \_\_\_\_\_.  
 a) enzymes or microbes              b) heat  
 c) radiations                            d) organic catalysts
- \_\_\_\_\_ is an example of oxidizing agent.  
 a)  $\text{NaBH}_4$                                 b)  $\text{LiAlH}_4$   
 c)  $\text{SeO}_2$                                   d) 1,3-dithiane
- Nitrogen/Helium/Argon is used as mobile phase in \_\_\_\_\_ chromatography.  
 a) Thin layer                              b) Gas  
 c) Paper                                      d) Column
- In adsorption chromatography the main force operating for separation is \_\_\_\_\_.  
 a) distribution force                      b) ion-exchange force  
 c) surface active force                  d) ligand attractive force
- \_\_\_\_\_ is an example of saponifying alkali.  
 a) Potassium hydroxide                b) Ethanol amine  
 c) Ethylene oxide adduct              d) Sodium bicarbonate
- Toilet soap can be represented by \_\_\_\_\_ general formula.  
 a)  $(\text{RCOO}^-)_2\text{Mg}^{++}$                   b)  $(\text{RCOO}^-)_2\text{Ca}^{++}$   
 c)  $\text{RCOO}^-\text{K}^+$                             d)  $\text{RCOO}^-\text{Na}^+$
- Molasses is the main byproduct of \_\_\_\_\_ industry.  
 a) Alcohol                                  b) Sugar  
 c) Paper                                      d) Soap
- Bone charcoal is used for \_\_\_\_\_ process in manufacturing of sugar.  
 a) Affination                                b) Decolourization  
 c) Dilution                                  d) Sulphitation

- B) Write One Word Answer for the following.** **06**
- 1) Heating of raw rubber in presence of sulfur and white lead at moderate temperature is known as?
  - 2) In green chemistry context PTC means?
  - 3) Umpolung or polarity inversion is carried by which reagent in presence of base?
  - 4) What is the term used for describing distance moved by solute to that by solvent front?
  - 5) Soap when vigorously shaken in water forms aggregate structure called as?
  - 6) What is the percentage of Ethanol present in rectified spirit?
- Q.2 Solve any Eight of the following.** **16**
- a) Give the classification of polymers based on the origin.
  - b) Write the steps involved in synthesis of Deriphat.
  - c) Name the detectors used in Gas Chromatography.
  - d) Write the steps involved in synthesis of Polystyrene.
  - e) Write the steps involved in synthesis of Polychloroprene.
  - f) Give the composition of Denatured spirit and absolute alcohol.
  - g) Mention the byproducts of Sugar industry.
  - h) Write the steps involved in conversion of Benzaldehyde into Acetophenone by using 1,3-dithiane
  - i) Give two examples of ionic liquids.
  - j) Mention the different types of soaps.
- Q.3 A) Attempt any Two of the following.** **10**
- 1) Write a note on refining of raw sugar.
  - 2) Write any five principles of Green Chemistry.
  - 3) Write a note on Gas Chromatography.
- B) Short Note/Solve** **06**
- Describe the steps involved in manufacture of soap by hot/boiled process.
- Q.4 A) Attempt any Two of the following.** **08**
- 1) How will you convert Benzaldehyde into Benzyl alcohol and Acetophenone into 2-phenyl ethanol?
  - 2) Write any four synthetic applications of Osmium tetroxide.
  - 3) Write synthesis and uses of BUNA-S rubber.
- B) Describe/Explain/Solve** **08**
- Describe in detail Thin Layer Chromatography.
- Q.5 Attempt any Two of the following.** **16**
- a) Describe in detail classification of synthetic detergents.
  - b) Write a note on manufacture of ethyl alcohol from molasses; mention the by-products of alcohol industry.
  - c) Write a note on Ziegler — Natta polymerisation and give synthesis and uses of Phenol formaldehyde resin.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper – XVI)**  
**Nursery, Gardening & Horticulture**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Choose the correct alternatives from the options. 10**

- 1) Seed viability test is otherwise called \_\_\_\_\_.  
 a) Ragdoll test                      b) Tetrazolium test  
 c) Vigour test                        d) Germination test
- 2) Liver red is variety of \_\_\_\_\_.  
 a) Orchid                                b) Aster  
 c) Anthurium                        d) Gladiolus
- 3) Mound layering is otherwise called \_\_\_\_\_.  
 a) Stool layering                      b) Chinese layering  
 c) Serpentine layering              d) Tip layering
- 4) Which among these is plant growth retardant?  
 a) Auxin                                b) Gibberellin  
 c) Absciscic acid                      d) Cytokinin
- 5) Chip budding is done in \_\_\_\_\_.  
 a) Rose                                  b) Grapes  
 c) Hibiscus                              d) Rubber
- 6) \_\_\_\_\_ is leading flower producing state.  
 a) Maharashtra                      b) Tamilnadu  
 c) Karnataka                        d) Kerla
- 7) Which among the given cities is known as garden city?  
 a) Mumbai                            b) Chandigarh  
 c) Delhi                                 d) Bengaluru
- 8) The tag colour associated with certified seeds \_\_\_\_\_.  
 a) Golden yellow                      b) Blue  
 c) Purple                                d) White

- 9) The seed act came into force  
a) 1958 b) 1946  
c) 1966 d) 1972
- 10) Queen of flowers is \_\_\_\_\_.  
a) Orchid b) Gladiolus  
c) Anthurium d) Rose

**B) Answer the following.**

06

- 1) What are the three types of nurseries?
- 2) Define seed bank.
- 3) What is manure?
- 4) Define pomology.
- 5) Define olericulture.
- 6) Enlist the methods of seed dormancy breaking.

**Q.2 Answer the followings (Any Eight):**

16

- 1) What are cut flowers?
- 2) Define biofertilizers.
- 3) What are biopesticides?
- 4) What is seed viability?
- 5) Define seed technology.
- 6) Define T-Budding.
- 7) Define approach grafting.
- 8) What is scion?
- 9) Define runner.
- 10) What is sucker?

**Q.3 A) Answer the followings (Any two):**

10

- 1) Write the aims and objectives of the nursery and gardening
- 2) What is grafting? Describe different types of grafting.
- 3) What is seed dormancy? Enlist the importance of seed dormancy.

**B) Write short notes.**

06

- 1) Genetic erosion
- 2) Home gardening and its types

**Q.4 A) Answer the followings (Any two):**

10

- 1) What is weed? Describe in detail methods of weed control.
- 2) What are Plant Growth regulators? Describe the role of PGR's in Horticulture.
- 3) What is Bonsai? Describe in detail method of making Bonsai.

**B) Describe/Explain/Solve the following.**

06

- 1) Define gardening and types of gardening in detail studied by you.
- 2) What is CAD? How CAD helps in landscaping?

**Q.5 Answer the following (Any Two).****16**

- a) What is seed? Describe the importance of seed testing and seed certification.
- b) What is floriculture? Describe the importance of flower shows and exhibitions.
- c) What is layering? Describe different types of layering techniques.

|             |  |
|-------------|--|
| Seat<br>No. |  |
|-------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper – XVI)**  
**Biostatistics**

Day & Date: Wednesday, 08-02-2023  
 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) Rewrite the sentence by using correct alternative.**

10

- 1) x-sign is used for \_\_\_\_\_.  
 a) Arithmetic mean                      b) Median  
 c) Mode                                      d) Deviation
- 2) Pie diagram is a \_\_\_\_\_.  
 a) One-dimensional diagram      b) Two-dimensional diagram  
 c) Circular diagram                  d) Three-dimensional diagram
- 3) Standard deviation was first worked out by \_\_\_\_\_.  
 a) Karl Pearson                      b) Milton Friedman  
 c) Harvey Goldstein                  d) Herman Hollerith
- 4) T-test is developed by \_\_\_\_\_.  
 a) Carl Pearson                      b) R.A. Fischer  
 c) William Gosset                      d) Laplace
- 5) Statistics helps in \_\_\_\_\_ fields.  
 a) Decision making, LIC banks  
 b) Government agencies and industries  
 c) Business, trade, index numbers  
 d) All the above
- 6) Primary data means \_\_\_\_\_.  
 a) Original data  
 b) It may be result of survey  
 c) It may be result of enquiry  
 d) All the above
- 7) \_\_\_\_\_ is not a measure of central tendency.  
 a) Mode                                      b) Mean  
 c) Range                                      d) Median

- 8) A variable which has some chance or probability of its occurrence is known as \_\_\_\_\_.  
a) Simple variable                      b) Quantitative variable  
c) Qualitative variable                d) Random variable
- 9) Number of students in your class is an example of \_\_\_\_\_.  
a) Mean                                      b) Statistics  
c) Mode                                      d) Median
- 10) Secondary data may be \_\_\_\_\_.  
a) Finished data  
b) Processed data  
c) Already collected by some other agency  
d) All the above

**B) Fill in the blanks.****06**

- 1) A qualitative characteristics is called \_\_\_\_\_.  
2) The definition of probability is provided by \_\_\_\_\_.  
3) The group of items selected in particularly manner is called \_\_\_\_\_.  
4) Standard deviation was first worked out by \_\_\_\_\_.  
5) In columns charts, bars are \_\_\_\_\_ in position.  
6) \_\_\_\_\_ deals with collection, organization and interpretation of data.

**Q.2 Answer the followings (Any Eight):****16**

- 1) What is mean by continuous variable?  
2) Mention merits of Median.  
3) Enlist methods of primary data collection.  
4) Write the characteristics of chi-square test.  
5) Write the formula of Standard Deviation.  
6) Sample point and sample space.  
7) Define tabulation.  
8) Define arithmetic mean.  
9) Give the formula for the calculation of probability.  
10) Discuss demerits of arithmetic mean.

**Q.3 A) Answer the followings (Any two):****10**

- 1) Discuss the basic concepts of biostatistics.  
2) Calculate the arithmetic mean of following data by using formula  
(The height of 10 plants found to be 17, 15, 21, 17, 16, 18, 17, 14, 19, 13 cm)  
3) Describe in brief different methods of sampling.

**B) Write a note on co-efficient of variations****06**

- Q.4 A) Answer the followings (Any two):** **08**
- 1) Discuss merits and demerits of standard deviation.
  - 2) Give the difference between primary data and secondary data.
  - 3) Mention the functions of biostatistics.
- B) Solve mean deviation and co-efficient of mean deviation from the arithmetic mean from the following data on seed weight:** **08**
- Data - 4.8, 5.5, 6.5, 7.1, 7.3, 7.5, 8.0 & 8.5
- Q.5 Answer the following (Any Two).** **16**
- a) Calculate the range of following data by using formula. (The heights (in cm) of ten individual of wheat plants in a plot are 70, 50, 60, 90, 80, 65, 40, 75, 55 and 85).
  - b) Describe the methods of primary data collection.
  - c) Describe the different type of probability.



- 10) Which of the following species are commonly cultivated species of Lac Culture in India?
- |                 |                  |
|-----------------|------------------|
| a) Kerria lacca | b) Lacifer Lacca |
| c) Rana tigrina | d) Both a and d  |

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ 06**  
**Give the name/Predict the product etc.**

- 1) Define fish preservation.
- 2) Note on Honey bee species in India.
- 3) Write a short note on Fish seed.
- 4) Write a short note on Species of honey bees in India.
- 5) Write a short note on Species of Lac insects.
- 6) Note on Nutritive value of egg.

**Q.2 Answer the followings (Any Eight): 16**

- 1) Give an account on Fish culture.
- 2) Write a short note on Fish harvesting.
- 3) Give an account on Cultivation of lac insect.
- 4) Write a short note on Natural enemies of silkworm.
- 5) Give an account on common dairy animals.
- 6) Note on Incubation and hatching of eggs.
- 7) Give an account on Mulberry silkworm culture.
- 8) Write a short note on Medicinal value of honey.
- 9) Note on Types of silk.
- 10) Give an account on Zebrafish; as a model organism in research.

**Q.3 A) Answer the followings (Any two): 10**

- 1) Describe in detail Application of biostatistics in Fishery.
- 2) Give an account on Depletion of fisheries resources.
- 3) Write a note on Natural enemies of honey bee and their control.

**B) Write a short note on Fishing crafts and Gears. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Give an account on Life history of Apis.
- 2) Write a note on Milk and milk products.
- 3) Give an account on Housing and Equipment for poultry birds.

**B) Describe in detail the byproducts of fishing industry. 08**

**Q.5 Answer the following (Any Two). 16**

- a) Give an account on processing and uses of lac.
- b) Give an account on Culture of fresh water prawn.
- c) Write a note on application of remote sensing and GIS in fisheries.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Special Paper - XVI)**  
**Integral Calculus**

Day & Date: Wednesday, 08-02-2023  
 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.

**Q.1 A) Fill in the blanks by choosing correct alternatives given below. 10**

1)  $\int_0^{\infty} e^{-ax} x^{n-1} dx = \underline{\hspace{2cm}}$ .

a)  $\frac{n}{a^n}$

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

c)  $\frac{n}{a}$

d)  $\frac{n}{a^{n-1}}$

2) If  $0 < P < 1$  the  $\int_0^P \int_{1-P}^1 = \underline{\hspace{2cm}}$ .

a) 1

b)  $\pi/2$

c)  $\frac{\pi}{\sin P\pi}$

d)  $\frac{P\pi}{\sin P\pi}$

3)  $\beta(m+1, n) = \underline{\hspace{2cm}}$

a)  $\beta(m, n+1)$

b)  $\frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}$

c)  $\frac{m}{(m+n)} \beta(m, n)$

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

4)  $\int_0^2 (8 - x^3)^{-1/3} dx = \underline{\hspace{2cm}}$

a)  $\frac{1}{3} \beta\left(\frac{1}{3}, \frac{2}{3}\right)$

b)  $\frac{1}{3} \beta\left(\frac{1}{2}, \frac{1}{3}\right)$

c)  $\frac{1}{2} \beta\left(\frac{1}{3}, \frac{2}{3}\right)$

d)  $\beta(2, 3)$

5) The area bounded by the polar curve  $r = f(\theta)$  and the lines  $\theta = \alpha$  and  $\theta = \beta$  is given by  $\underline{\hspace{2cm}}$ .

a)  $\int_{\alpha}^{\beta} \int_{r=0}^{f(\theta)} r dr d\theta$

b)  $\frac{1}{2} \int_{\alpha}^{\beta} \int_{r=0}^{f(\theta)} r dr d\theta$

c)  $\int_{\alpha}^{\beta} \int_{\theta}^{f(\theta)} r dr d\theta$

d)  $\frac{1}{2} \int_{\alpha}^{\beta} \int_{\theta}^{f(\theta)} dr d\theta$

- 6) Change the order of integration in the double integral  $\int_0^1 \int_y^1 f(x, y) dx dy = \underline{\hspace{2cm}}$ .
- a)  $\int_0^1 \int_x^1 f(x, y) dx dy$       b)  $\int_0^1 \int_0^x f(x, y) dy dx$
- c)  $\int_0^x \int_0^y f(x, y) dx dy$       d)  $\int_1^y \int_0^x f(x, y) dx dy$
- 7) Area lying between the parabola  $y = 4x - x^2$  and the line  $y = K$  is  $\underline{\hspace{2cm}}$
- a)  $\frac{1}{2}$  units      b) 3 units
- c)  $\frac{3}{2}$  units      d)  $\frac{9}{2}$  units
- 8) Integral  $\int_a^b f(x) dx$  is said to be improper if  $\underline{\hspace{2cm}}$ .
- a) one or both the limits of integration are infinite
- b) both the limits are finite
- c)  $f(x)$  is bounded in  $(a, b)$
- d)  $f(x)$  is bounded in  $[a, b]$
- 9) The  $\mu$  test states that if  $b$  is the only point of infinite discontinuity of  $f$  on  $[a, b]$  and  $\lim_{n \rightarrow b} (b - x)^\mu f(x)$  exists and  $\underline{\hspace{2cm}}$  then  $\int_a^b f(x) dx$  converges if and only if  $\mu < 1$ .
- a) is zero      b) is any non zero
- c) is non zero finite      d) is any value
- 10) The integral  $\int_0^\infty \frac{x^{2n}}{1+x^{2m}} dx$  is convergent if  $\underline{\hspace{2cm}}$ .
- a)  $m > n$       b)  $n > m$
- c)  $n = m$       d)  $n \neq m$

**B) Give answer of following****06**

- 1)  $\int_0^{\pi/2} \sin^5 \theta \cos^3 \theta d\theta = \underline{\hspace{2cm}}$
- 2) If  $\int_a^\infty |f(x)| dx$  is convergent then the integral  $\int_a^\infty f(x) dx$  is  $\underline{\hspace{2cm}}$ .
- 3)  $\int_a^\infty \sin x dx$  is an improper integral of  $\underline{\hspace{2cm}}$  kind.
- 4) The improper integral  $\int_a^b \frac{dx}{(b-x)^p}$  converges if  $\underline{\hspace{2cm}}$ .
- 5) Value of  $\int_1^2 \int_0^{3y} y dy dx = \underline{\hspace{2cm}}$ .
- 6) Value of  $\sqrt{2}$  is  $\underline{\hspace{2cm}}$ .

**Q.2 Solve any Eight of the following.****16**

- a) Test the convergence of  $\int_0^1 \frac{dx}{x^3}$
- b) Test the convergence of  $\int_2^\infty \frac{2x^2}{x^4-1} dx$
- c) Test the convergence of  $\int_0^1 \frac{dx}{x^3(1+x^2)}$
- d) Define improper integral of second kind.
- e) Prove that  $\beta(m, n) = \beta(n, m)$

- f) Show that  $\int_0^{\pi/2} \sqrt{\tan \theta} \, d\theta = \frac{1}{2} \sqrt{\frac{3}{4}} \sqrt{\frac{1}{4}}$
- g) Define Beta and Gamma function.
- h) Prove that  $\sqrt{\frac{1}{2}} = \sqrt{\pi}$
- i) Solve  $\int_1^{\log \infty} \int_0^{\log y} e^{x+y} \, dx dy$
- j) Solve  $\int_0^\pi \int_0^{a\theta} r^3 \, d\theta \, dr$

**Q.3 A) Attempt any Two of the following.****10**

- 1) Show that the improper integral  $\int_a^\infty \frac{dx}{x^p}$  converges if and only if  $p > 1$  and divergent if  $p \leq 1$
- 2) Prove that  $\beta(m, n) = \int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} \, dx$
- 3) Show that area of ellipse  $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$  is  $\pi ab$  using double integration.

**B) Solve  $\iint xy \, dx dy$  over the first quadrant of  $x^2 + y^2 = a^2$** **06****Q.4 A) Attempt any Two of the following.****08**

- 1) If  $f(x)$  and  $g(x)$  are positive and  $\lim_{x \rightarrow \infty} \frac{f(x)}{g(x)} = L$  where  $L$  is non zero finite number then show that two integral  $\int_a^\infty f(x) \, dx$  and  $\int_a^\infty g(x) \, dx$  behave alike.
- 2) State and prove relation between Beta and Gamma function.

- 3) Change the order of integration  $\int_0^{2a} \int_{x^2/4a}^{(3a-x)} f(x, y) \, dx dy$

**B) Show that  $\sqrt{\pi} \sqrt{2m} = 2^{2m-1} \sqrt{m} \sqrt{m + 1/2}$** **Q.5 Attempt any Two of the following.****16**

- a) State and prove Abel's Test for improper integrals of a product of two function.
- b) 1) Show that  $\beta(m, n) = \beta(m+1, n) + \beta(m, n+1)$   
 2) Evaluate  $\sqrt{-1/2} \sqrt{-3/2}$
- c) Using transformation  $\frac{x^2}{y} = u, \frac{y^2}{x} = v$  find  $\iint x^2 y^2 \, dx dy$  over the area bounded by four parabola  $y^2 = 4x, y^2 = 8x, x^2 = 4y, x^2 = 8y$

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**MATHEMATICS (Special Paper - XVI)**  
**Programming In C**

Day & Date: Wednesday, 08-02-2023  
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) \_\_\_\_\_ is the three dimensional array.  
a) Table  
b) Product  
c) Chart  
d) Survey
- 2) \_\_\_\_\_ is the derived type of data.  
a) Pointer  
b) Hoat  
c) Union  
d) None of these
- 3) The \_\_\_\_\_ is the header file contains math function.  
a) <stdio.h>  
b) <math.h>  
c) <coin.h>  
d) None of these
- 4) \_\_\_\_\_ is the jumping statement.  
a) switch  
b) white  
c) goto  
d) none of these
- 5) Input data through keyboard using \_\_\_\_\_ function.  
a) printf  
b) scan-f  
c) float  
d) Integer
- 6) \_\_\_\_\_ is the conditional statement.  
a) for  
b) while  
c) dowhile  
d) switch
- 7) The meaning of operator "If" is \_\_\_\_\_.  
a) OR  
b) AND  
c) NOR  
d) Address
- 8) Math function for 'arctangent of x' is \_\_\_\_\_.  
a) tan (x)  
b) tanh (x)  
c) atan(x)  
d) None of these
- 9) 'If not equal to' is the meaning of the operator \_\_\_\_\_.  
a) <=  
b) \=  
c) >=  
d) None of these

- 10) Modulo division is a meaning of the operators \_\_\_\_\_.  
 a) %                                      b) +  
 c) \*                                        d) None of these

**B) Answer in the one sentence.**

06

- 1) C - language contains how many keywords.
- 2) The meaning of the character '\V' is?
- 3) Every C program statement ends with?
- 4) One dimensional array is called?
- 5) What is the meaning of the function 'atan2(x,y)'?
- 6) What is the meaning of the function 'fmod (x,y)'?

**Q.2 Answer the followings. (Any Eight)**

16

- 1) Write the C - arithmetic operator with their meaning.
- 2) Explain 'Basic structure' of C program.
- 3) State the general form of "scanf function" and "printf function".
- 4) Explain the term 'conditional operator'.
- 5) Explain one dimensional array.
- 6) Write the general form of "goto" and "lable statement".
- 7) What does 'int main (void)' mean?
- 8) Why and when we use '#include directives'?
- 9) Write the flowchart of 'exit controlled loop'?
- 10) Draw a tree diagram of 'C - Tokans'?

**Q.3 A) Answer the followings. (Any two)**

10

- 1) Explain logical and assignment operator.
- 2) Give two note on the switch statement.
- 3) Explain Multidimensional Array.

**B)** Explain goto and 'For' statement with example.

06

**Q.4 A) Answer the followings. (Any two)**

08

- 1) Explain Bitwise and spatial operators.
- 2) Write the program 'for' to calculate the average no of set N.
- 3) Explain the need of one dimensional array.

**B)** Write the table for Math function with meaning.

08

**Q.5 Answer the following. (Any Two)**

16

- Write the table for summary of C - operator.
- Explain all types of C - constant.
- Write the program with flowchart for "Display a pyramid".

|             |  |
|-------------|--|
| Seat<br>No. |  |
|-------------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper - XVI)**  
**Quality Management and Reliability**

Day & Date: Wednesday, 08-02-2023  
 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) Choose the correct alternatives from the options. 10**

- 1) Shewhart control charts are insensitive to \_\_\_\_\_ process shifts.  
 a) Small ( $< 1.5\sigma$ )                      b) Medium ( $1.5\sigma < \text{shift} < 3\sigma$ )  
 c) Big ( $> 6\sigma$ )                              d) Very Big
- 2) The purpose of Acceptance sampling is to \_\_\_\_\_.  
 a) Estimate lot conformity    b) Estimate lot quality  
 c) Estimate lot defectives    d) Sentence lots
- 3) Which of these is not a part of magnificent seven of SPC?  
 a) Pareto chart                      b) Check Sheet  
 c) Scatter Diagram                d) 2k factorial design
- 4) One-sided upper cusum statistic is \_\_\_\_\_.  
 a)  $C_i^+$                                       b)  $C_i^-$   
 c)  $C_i$                                         d) None of these
- 5) In Quality Management 'Cause and effect diagram' is also known as  
 a) Fish diagram                      b) Flowchart  
 c) Fishbone diagram                d) None of these
- 6) Exponential distribution is \_\_\_\_\_.  
 a) IFR                                      b) DFR  
 c) both (a) and (b)                    d) None of these
- 7) Cut vector of a parallel system of 2 components is  
 a) (1, 1)                                    b) (1, 0)  
 c) (0, 1)                                    d) None of these
- 8) EWMA charts are better than Shewhart control charts in detecting the \_\_\_\_\_ shifts.  
 a) Small process                      b) Medium process  
 c) Large process                        d) None of these

- 9) The structure function of a binary system S takes any one of \_\_\_\_\_ possible values
- a) 4                                      b) 2  
c) 3                                      d) None of these
- 10) In a Single Sampling Plan if incoming lots are of quality  $p = 0.01$ ,  $P_a = 0.9397$  and the lot size  $N$  is large relative to the sample size  $n$ , then AOQ is approximately equal to
- a) 0.9397                                b) 0.009397  
c) 0.09397                               d) 0.09793

**B) Define the following**

06

- 1) The full form of 'P' in the PDCA cycle in Quality Management is \_\_\_\_\_.
- 2) If the value of  $\bar{X}_i = 9.29$ ,  $C_{i-1} = 2.56$  and  $\mu = 10$  then the cumulative sum  $C_i$  up to and including the  $i^{th}$  sample is \_\_\_\_\_
- 3) The full form of M in the EWMA chart is \_\_\_\_\_.
- 4) In a Single Sampling Plan if the lot size  $N$  is large relative to the sample size  $n$ , then we may write the equation of AOQ approximately as \_\_\_\_\_.
- 5) A set of components whose functioning ensures the functioning of the system is known as \_\_\_\_\_.
- 6) The full form of 'Q' in the AOQL is \_\_\_\_\_.

**Q.2 Answer the followings (Any Eight):**

16

- 1) What is the meaning of Quality?
- 2) What is Producer's risk?
- 3) What is ATI?
- 4) Define a parallel system.
- 5) Define a structure function of a system of  $n$  components.
- 6) Define 2-out-of-3 system.
- 7) What is the long form of DMAIC cycle?
- 8) Define AQL.
- 9) What is process control?
- 10) What is a cut vector?

**Q.3 A) Answer the followings (Any two):**

10

- 1) In a single sampling plan if sample size  $n = 10$ , acceptance number  $c = 1$ , and lot quality  $p = 0.08$ , find the probability of rejecting the lot by using binomial distribution.
- 2) Explain any two dimensions of quality.
- 3) Find the minimal cut vectors of a series system of 2 components.

**B)** Write a procedure of Single Sampling Plan.

06

- Q.4 A) Answer the followings (Any two):** **08**
- 1) What is the value of lower control limit for the period  $i = 1$  for a EWMA chart which has value of  $\lambda = 0.10, L = 2.7, \sigma = 1$  and the value of  $\mu_0 = 10$ ?
  - 2) Find the reliability of a parallel system of 3 independent components whose reliabilities are  $p_1 = p_2 = p_3 = 0.7$ .
  - 3) What are the advantages of acceptance sampling?
- B)** Find the failure rate function (hazard rate) for a series system of 3 independent components, where life time  $T_1$  of  $i^{th}$  component is exponentially distributed with mean  $10^i$  hrs, for  $i = 1, 2, 3$ . **08**
- Q.5 Answer the following (Any Two).** **16**
- 1) Explain the Tabular CUSUM for monitoring the process mean.
  - 2) Write a note on a magnificent tool of quality- Pareto diagram.
  - 3) Suppose a mobile phone company produces mobile phones in lots of size 400 phones each. To check the quality of lots, the quality inspector of the company uses a double sampling plan with  $n_1 = 15, c_1 = 1, n_2 = 30, c_2 = 3$ . If the incoming quality of the lot is 0.05, calculate the probabilities of acceptance of the lot on first sample ( $P_a^1$ ) and on the second sample ( $P_a^2$ ). What is the probability of acceptance of the lot on the combined sample in the double sampling plan ( $P_a$ )? Find AOQ. Assume number of defective items found in the samples follows binomial distribution.



|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- 10) The fire in a factory is an example of: \_\_\_\_\_
- a) Secular trend
  - b) Seasonal movements
  - c) Cyclical variations
  - d) Irregular variation

**Q.1 B) Fill in the blank.** **06**

- 1) There are \_\_\_\_\_ components in the time series.
- 2) Exponential smoothing is also called as \_\_\_\_\_.
- 3) Link relative method is also called as \_\_\_\_\_.
- 4) If for a time series process, its mean, variance and autocorrelation structure do not change over time, then it is called as \_\_\_\_\_.
- 5) Non predictable fluctuations observed in time series data are termed as \_\_\_\_\_.
- 6) In time series analysis independent variable is \_\_\_\_\_.

**Q.2 Solve any eight of the following.** **16**

- a) Define Seasonal variation of a time series.
- b) List down all the components of a time series.
- c) Define MA(1) model.
- d) Define auto-covariance function.
- e) Which tests are used to check randomness of a series against trend and seasonality?
- f) State additive model of a time series. Also describe every term involved in it.
- g) Define stationary time series
- h) Define AR(2) model.
- i) Define irregular variation. Also give examples of this kind of variation.
- j) What are the demerits of moving average method?

**Q.3 A) Attempt any two of the following.** **10**

- 1) Write a note on moving average method.
- 2) Describe run test for checking randomness of a series against trend and seasonality.
- 3) Discuss various time series plots as well as historigram.

**Q.3 B) Write a note on harmonic analysis.** **06**

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

- 1) Describe least square method for trend estimation.
- 2) Describe auto-covariance function. Also state its properties.
- 3) Describe link relative method.

**Q.4 B) Describe double exponential smoothing.** **08**

**Q.5 Attempt any two of the following.** **16**

- a) Discuss ratio to moving average method.
- b) Discuss estimation of mean square error of forecasting.
- c) Write down the estimation procedure for parameters of MA (2) process.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P****B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022****GEOLOGY (Special Paper-XVI)****Geochemistry**

Day &amp; Date: Wednesday, 08-02-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

- 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 the correct alternatives from the options.****10**

- 1) Elements which readily-form ions with an outermost 8-electron shell are:
  - a) Siderophile
  - b) Chalcophile
  - c) Lithophile
  - d) Atmosphere
- 2) Among the chemical elements, the most abundant chemical element in the earth's crust is \_\_\_\_\_.
  - a) Silicon
  - b) Oxygen
  - c) Iron
  - d) Aluminium
- 3) Long-term changes in the geochemical cycle are known as:
  - a) Periodic changes
  - b) Permanent changes
  - c) Secular changes
  - d) Perennial changes
- 4) Which of the following method is used for dating relatively recent geological event?
  - a) K - Ar method
  - b) U - Pb method
  - c) Carbon - 14 methods
  - d) Rb - Sr method
- 5) The water loving colloids are called as:
  - a) Hydrophobic
  - b) Hydrophilic
  - c) Dispersion
  - d) Emulsions
- 6) Siderites consist essentially of a.
  - a) Nickle - iron alloy
  - b) Nickel-iron alloy and silicates
  - c) Silicates only
  - d) Silicates and graphite
- 7) In the periodic table of elements, the elements are arranged in order of:
  - a) Decreasing atomic weight
  - b) Increasing atomic number
  - c) Increasing volume
  - d) Decreasing atomic number
- 8) Different element **with**, same neutron number but with different values of atomic weight and protons are known as.
  - a) Isotopes
  - b) Isotones
  - c) Isobars
  - d) Isotherms

- 9) Two or more substances that have the same or closely similar chemical formulas but different crystal structures are known as:
- a) Isomorphism
  - b) Polymorphism
  - c) Pseudomorphism
  - d) None of the above
- 10) A bond that results from the total transfer of electrons from one atom to another is known as:
- a) Ionic bond
  - b) Covalent bond
  - c) Hydrogen bond
  - d) Van der Waals bond

**B) Define the following****06**

- 1) Isotope
- 2) Chondrites
- 3) Isomorphism
- 4) Adsorption
- 5) Camouflaged
- 6) Metallic Bonding

**Q.2 Answer the followings (Any Eight):****16**

- 1) List the four most abundant elements in the continental crust.
- 2) Give any two examples of polymorphs.
- 3) List the four types of colloids.
- 4) Name the types of adsorption.
- 5) Name the two types of siderolites.
- 6) List the four chalcophile elements of geochemical classification.
- 7) Name the high field strength elements.
- 8) Give examples of hydrophobic sol.
- 9) Name any four stable isotopes.
- 10) List the four major oxides of average composition of igneous rocks.

**Q.3 A) Answer the followings (Any two):****10**

- 1) Write note on Aerolite type of meteorite.
- 2) Discuss in detail cosmic abundance of elements with suitable diagram.
- 3) Describe in brief geochemical cycle with suitable diagram.

**B) Write short note on types of radioactivity with suitable examples.****06****Q.4 A) Answer the followings (Any two):****08**

- 1) Explain the different types of solid solution substitution with diagram.
- 2) Discuss the applications of radiogenic isotopes.
- 3) Discuss any four minor elements in magmatic crystallization.

**B) Describe in brief the Goldsmith's classification of geochemical elements.****08****Q.5 Answer the following (Any Two).****16**

- 1) Explain in detail the composition of Meteorites.
- 2) Describe the types of chemical bonding with coordination number.
- 3) Discuss any four radiogenic methods used for dating geologic events.

|             |  |
|-------------|--|
| Seat<br>No. |  |
|-------------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Special Paper - XVI)**  
**Environment Microbiology**

Day & Date: Wednesday, 08-02-2023  
 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) Neat diagrams must be drawn wherever necessary.  
 4) Use of log table or calculator is allowed.

**Q.1 A) Choose the correct alternatives from the options.**

**10**

- 1) The term biosafety refers to \_\_\_\_\_.  
 a) the prevention of large-scale loss of biological integrity  
 b) the focus both on ecology and human health  
 c) protect from harmful incidents  
 d) All of the above
- 2) \_\_\_\_\_ feature allows fungal spores to remain viable in air for longer period than their vegetative forms.  
 a) Thicker cell wall                      b) Smaller in size  
 c) resistance to heat                      d) resistance to alcohol
- 3) \_\_\_\_\_ causative agent of airborne pulmonary anthrax disease.  
 a) *Bacillus anthracis*  
 b) *Coccidioides immitis*  
 c) *Legionella pneumophila*  
 d) *Blastomyces dermatitis*
- 4) What happens when phosphorus, nitrates, and detergents in water lead to an acceleration in the growth of algae?  
 a) Extinction  
 b) Eutrophication  
 c) Increase in the number of fishes  
 d) increase in the number of aquatic plants
- 5) Which extremophile lives in high areas of pressure?  
 a) Acidophile                                  b) Barophile  
 c) Psychrophile                              d) Halophile
- 6) \_\_\_\_\_ is the amount of oxygen required to oxidize only organic matter in sewage.  
 a) Turbidity                                  b) BOD  
 c) COD                                          d) DO
- 7) \_\_\_\_\_ is determined by measuring the dissolved oxygen used during the chemical oxidation of organic matter in 3 hours.  
 a) COD                                          b) BOD  
 c) ThOD                                          d) TOC

- 8) \_\_\_\_\_ indicates chemical characteristics of industrial wastewater.  
a) pH  
b) BOD  
c) COD  
d) All of these
- 9) The bioremediation process involving the usage of plants to degrade pollutants is \_\_\_\_\_.  
a) Composting  
b) Biopile  
c) Phytoremediation  
d) Land farming
- 10) \_\_\_\_\_ is the scientific field at the intersection of geology and microbiology and is a major subfield of geobiology.  
a) Air Microbiology  
b) Water Microbiology  
c) Geomicrobiology  
d) Marine Biology

**B) Fill in the blank/Defamation/One sentence answer/One-word answer/ Give the name/Predict the product etc. 06**

- 1) Define 'Bioremediation'
- 2) Define 'Extremophiles'
- 3) Give the two examples of thermophiles
- 4) Give the two examples of acidophiles
- 5) Define 'Geomicrobiology'
- 6) Define Air Microbiology'

**Q.2 Answer the followings (Any Eight):** **16**

- 1) What is Eutrophication?
- 2) Give the sources of air pollution.
- 3) Give the significance of COD.
- 4) Enlist the methods to study aquatic microorganisms.
- 5) What is Carbon Credit?
- 6) Give the significance of bioaerosol.
- 7) What is carbon sequestration?
- 8) What is bioleaching?
- 9) Enlist the various types of industrial waste.
- 10) Enlist the various methods of wastewater assessment and management.

**Q.3 A) Answer the followings (Any two):** **10**

- 1) Describe the various methods to study airborne microorganisms.
- 2) Describe in detail Eutrophication.
- 3) Explain the treatment of waste from the dairy industry.

**B) Write a short note on Bioremediation. 06**

**Q.4 A) Answer the followings (Any two):** **08**

- 1) Explain the significance of Bioaerosol.
- 2) Explain the various general characteristics of extremophiles.
- 3) Explain the significance of BOD.

**B) Describe the sugar industry as 'Zero waste technology'. 08**

**Q.5 Answer the following (Any Two). 16**

- Explain the concept of carbon sequestration in detail.
- Describe the methods of oil recovery.
- Explain the bioleaching of uranium.



- 10) Pulsed RADAR uses \_\_\_\_\_ type of display.
- a) CRO
  - b) PPI
  - c) CRT
  - d) ILD

**B) Answer in one sentence. 06**

- 1) What is communicating satellite?
- 2) What are the types of optical fiber?
- 3) What is frequency range of cellular phone system?
- 4) What are the types of computer networking?
- 5) Name the semiconducting devices used in microwave communication.
- 6) What are the types of modems?

**Q.2 Answer the followings (Any Eight): 16**

- 1) Calculate bit rate if bit deviation period is 2.5 ms.
- 2) What is working principle of optical fiber communication?
- 3) Define up link and down link frequency of satellite.
- 4) Explain any four applications of microwave.
- 5) What is computer communication? What are its types?
- 6) What are the sources and detectors used in optical fiber communication?
- 7) Define transmission line? What are its types?
- 8) Define protocol and server.
- 9) What is role of transponder in satellite communication?
- 10) What is hand off process used in mobile communication?

**Q.3 A) Answer the followings (Any two): 10**

- 1) Explain wave guide used in micro wave communication.
- 2) Explain Avalanche photo diode as detector used for optical fiber communication.
- 3) Explain satellite communication system.

**B) Explain concept of digital data communication along with different digital codes used for computer communication. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Explain frequency synthesizer block used in mobile communication.
- 2) Explain principle of RADAR.
- 3) Explain how satellite is used for surveillance and navy.

**B) Describe splicing techniques used in optical fiber. 08**

**Q.5 Answer the following (Any Two). 16**

- a) Explain pulsed RADAR system with necessary block diagram.
- b) What is internet? Explain the applications of the internet.
- c) Explain satellite earth station with necessary block diagram.



|             |  |
|-------------|--|
| Seat<br>No. |  |
|-------------|--|

Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Paper - XVII)**  
**Advance Python**

Day & Date: Wednesday, 08-02-2023  
 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) Neat diagrams must be drawn wherever necessary.  
 4) Use of log table or calculator is allowed.

**Q.1 A) Choose the correct alternatives from the options. 10**

- 1) Config() in Tkinter is used for \_\_\_\_\_.  
 a) Delete the widget                      b) Change the property of the widget  
 c) Place the widget                        d) Bind the widget
- 2) \_\_\_\_\_ method of layout manager is used based on x, y coordinate.  
 a) pack()                                      b) grid()  
 c) place()                                     d) bind()
- 3) The \_\_\_\_\_ widget is used to display multiline text.  
 a) Label                                        b) Text Area  
 c) Entry                                        d) Message
- 4) The \_\_\_\_\_ method of ListBox widget is used to retrieve the index or position of selected item.  
 a) curselection()                            b) get()  
 c) index()                                      d) xview()
- 5) The \_\_\_\_\_ module is used to work with MySQL database in python.  
 a) mysql                                        b) MySQLdb  
 c) mysqlclient                                d) MySQLLite
- 6) The \_\_\_\_\_ widget is used to enter or display one line of text.  
 a) Label                                        b) Text Area  
 c) Entry                                        d) Text
- 7) Django can follow \_\_\_\_\_ architectural pattern.  
 a) PHP                                            b) Angular JS  
 c) MVVC                                        d) MVT
- 8) In Django, view.py file contains \_\_\_\_\_.  
 a) list of files in templates folder  
 b) form to enter the data in database  
 c) functions to return HTML files  
 d) list of HTML files
- 9) In Django \_\_\_\_\_ command is used to retrieve all the 'User' records from a given database.  
 a) Users.objects.all()                      b) User.objects.all()  
 c) Users.all\_records()                      d) User.object.all()

- 10) In Django, there are \_\_\_\_\_ number of HTTP requests.
- a) 2
  - b) 3
  - c) 4
  - d) 6

**Q.1 B) Fill in the blank. 06**

- 1) \_\_\_\_\_ command is used to check version of Django.
- 2) DOM stands for \_\_\_\_\_.
- 3) The \_\_\_\_\_ method of socket object is used to translate a host name to IPv4 address format.
- 4) \_\_\_\_\_ file is very useful for a command-line utility that lets you interact with Django project in various ways.
- 5) After creating connection with MySQL, you can interact with database using \_\_\_\_\_ object.
- 6) \_\_\_\_\_ command is used to install all classes related to MySQL connection.

**Q.2 Answer the followings (Any Eight): 16**

- 1) What are different parameters required for connect method?
- 2) What is XML? Give example.
- 3) Write a command to create Django project and app?
- 4) What are the uses of the start and extend attribute of create\_app?
- 5) List out containers used in python GUI with an example.
- 6) What is URL Routing in Django?
- 7) What is Spinbox? Give an example.
- 8) How to connect google website using socket?
- 9) What is the difference between grid and place layout managers?
- 10) How to create a superuser in the Django project?

**Q.3 A) Answer the followings (Any two): 10**

- 1) Write python code to insert and delete records from the database.
- 2) Explain different Server Socket Methods and Client Socket Methods in detail.
- 3) Explain MVC design pattern used in Django.

**B) Write python code for creating a line, oval, rectangle, and arc on the window. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Explain different methods used for cursor objects.
- 2) What is migration? Explain migration with an example.
- 3) Explain XML Parser Architecture.

**B) Describe event binding and event patterns used in python GUI programming with example. 08**

**Q.5 Answer the following (Any Two). 16**

- a) Write python code for client and server communication.
- b) Explain the menu widget with example.
- c) Write python code for parse any XML file using SAX and DOM API technique.

|                     |  |
|---------------------|--|
| <b>Seat<br/>No.</b> |  |
|---------------------|--|

**B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2022  
Software Testing**

Day & Date: Thursday, 09-02-2023  
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) Choose the correct alternatives from the options. 10**

- 1) \_\_\_\_\_ is not a Software Development Life Cycle Phase?  
a) Requirements Gathering      b) Coding  
c) Test Closure                      d) Testing
- 2) Test cases are designed during \_\_\_\_\_.  
a) Test recording                      b) Test planning  
c) Test configuration                  d) Test specification
- 3) Which of the following comes under the Control Structure Testing?  
a) Condition testing                  b) Loop testing  
c) Data Flow Testing                  d) All of these
- 4) Which of the following is black box testing technique?  
a) Basic path testing                  b) Boundary value analysis  
c) Code path analysis                  d) None of these
- 5) Which of the following is not a part of test plan?  
a) Scope                                  b) Mission  
c) Objective                              d) Risk
- 6) Which is the following example of load testing?  
a) Downloading large contents from the internet  
b) Running multiple applications on a computer or server simultaneously  
c) Printing large document using printer in a queue  
d) All the above
- 7) Which are the following characteristics of Exploratory Testing?  
a) Minimum planning and maximum execution  
b) Useful in situations with poor specification and limited time  
c) Both A and B  
d) None of these

- 8) Which of the following requirements is testable?
  - a) The system shall be user friendly
  - b) The response time shall be less than one second for the specified design load
  - c) The safety-critical parts of the system shall contain zero faults
  - d) The system shall be built to be portable
- 9) In the V model, testing starts in parallel with the development.
  - a) True
  - b) False
- 10) Which is not a part of Decision Table?
  - a) Rule portion
  - b) Driver portion
  - c) Condition portion
  - d) Action portion

**B) Fill in the blank. 06**

- 1) Testing is done without planning and documentation is called \_\_\_\_\_.
- 2) Cyclomatic Complexity is measured by \_\_\_\_\_.
- 3) A logical collection of test cases is called as \_\_\_\_\_.
- 4) Testing phase starts after the Development phase \_\_\_\_\_.
- 5) Testing of individual components by the developer's in \_\_\_\_\_.
- 6) User Acceptance testing is a type of \_\_\_\_\_.

**Q.2 Solve any eight of the following. 16**

- 1) What is Pair Testing?
- 2) Define Error guessing.
- 3) What are the phases of testing?
- 4) What are the objectives of system testing?
- 5) What is the use Loop Testing?
- 6) Define Test Summary Report.
- 7) Distinguish between Alpha & Beta Testing.
- 8) What are the needs of testing?
- 9) Define Failure.
- 10) Define Boundary value analysis.

**Q.3 A) Attempt any two of the following questions. 10**

- 1) What is Requirement Traceability Matrix? How to prepare Requirement Traceability Matrix.
- 2) What is Review process? How to Preparing Review Report.
- 3) What is Integration testing? Discuss Top-down and bottom-up Integration Testing.

**B) Design a Test case for login page. 06**

- Q.4 A) Attempt any two of the following questions. 08**
- 1) What is white box testing? How decision coverage is differing from statement coverage?
  - 2) What is stress testing? Why stress testing is needed? Explain with example.
  - 3) What is Test Case? Explain Test Case Template suitable with example.
- B) What is Performance testing? Explain types of performance testing. 08**
- Q.5 Attempt any two of the following questions. 16**
- a) Explain Defect Life Cycle.
  - b) Explain regression testing with its types.
  - c) What are the advantages of smoke testing? How Smoke Testing works. Explain with Example.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- 11) \_\_\_\_\_ is the antonym for 'folly'.
- a) Wisdom                      b) Silly
- c) Clear                        d) Mistake
- 12) \_\_\_\_\_ is the synonym for 'remote'.
- a) Wet                          b) Shadow
- c) Mobile                     d) Distant
- 13) \_\_\_\_\_ is the synonym for 'novel'.
- a) New                         b) Prize
- c) Medal                      d) Old
- 14) \_\_\_\_\_ is the antonym for 'eager'
- a) Meager                     b) Sugar
- c) Sad                         d) Reluctant

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

16

- Comment on the subject matter of the poem 'My Grandmother's House'.
- What is the speaker's desire in the poem 'My Grandmother's House'?
- What awaits the Captain in the poem 'O Captain! My Captain!'?
- Analyze the metaphors used in the poem 'O Captain! My Captain!'.
- Comment on the beauty of the woman described in the poem 'She Walks in Beauty'.
- Comment on the theme of the poem 'Upagupta'.

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

12

- What will happen when you will meet a man who does not want money, according to Kipling?
- How should a foreigner speak when he/she wants to communicate or ask for directions, according to Shaw?
- What is meant by Prefix? Give four examples of prefixes.
- What is meant by Suffix? Give four examples of suffixes.

**Q.4 Answer any one of the following questions.**

14

What is meant by leadership Skills? Comment on qualities of a good leader.

**OR**

What are the techniques one should follow to become an effective team member?

**Q.5** Write in detail about how to manage your time in a better way.

14

**Seat  
No.**

## Max. Marks: 70

14

- Page 1 of 3



- 10) The tangential component of electric field at the interface is \_\_\_\_\_.  
a) discontinuous                      b) continuous  
c) zero                                  d)  $\infty$
- 11) Total power radiated by electric dipole is proportional to \_\_\_\_\_ of frequency.  
a) cube                                  b) square  
c) square root                      d) fourth power
- 12) Incident waves and transmitted waves are \_\_\_\_\_.  
a) always in phase                  b) always out of phase  
c) perpendicular                      d) crossed
- 13) Electromagnetic equations are known as \_\_\_\_\_ equations.  
a) Einstein's                          b) Maxwell's  
c) Newton's                          d) Rutherford's
- 14) The phase difference between H and E is given by \_\_\_\_\_.  
a)  $\phi = \sin^{-1} \frac{\beta}{\alpha}$                       b)  $\phi = \tan^{-1} \frac{\alpha}{\beta}$   
c)  $\phi = \tan \frac{\beta}{\alpha}$                           d)  $\phi = \tan^{-1} \frac{\beta}{\alpha}$

**Q.2 A) Answer the following questions. (Any Four)** **08**

- 1) Define displacement current density  $D$ .
- 2) Define wave impedance.
- 3) State Lenz's law of Electromagnetic induction.
- 4) State any two examples of EM waves.
- 5) State Poisson's equation.

**B) Write note. (Any Two)** **06**

- 1) Obtain an expression for total power radiated by an electric dipole.
- 2) Prove  $\nabla \times \vec{B} = \mu_0 \vec{J}$
- 3) Write a note on Boundary condition for EM Field vectors.

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) State Maxwell's equations in vacuum.
- 2) Explain Total Internal Reflection.
- 3) A glass-air interface has Refractive index  $n_2 = 1.59$  and  $n_1 = 1.0$  for normal incidence of EM wave. If Transmission coefficient is  $T = 0.65$  then calculate Reflection coefficient  $R$ .

**B) Answer the following questions. (Any One)** **06**

- 1) Explain Maxwell's correction to Ampere's circuital law.
- 2) State plane wave solutions for wave equations and prove transverse nature of EM waves.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Derive an expression for Retarded Time & Retarded potential.
- 2) Explain Mutual inductance and derive Newmann's formula.
- 3)

**B) Answer the following questions. (Any One) 04**

- 1) Explain skin depth.
- 2) Calculate critical angle of incidence for EM waves passing through dielectric quartz having dielectric constants 4.

**Q.5 Answer the following questions. (Any Two)****14**

- a)** Explain physical significance of Maxwell's equations.
- b)** Obtain solutions to Laplace's equation in spherical coordinate system.
- c)** Obtain Maxwell's wave equations and expression for phase velocity of Electromagnetic waves in dielectrics.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper-XIII)**  
**Molecular Biology**

Day & Date: Monday, 27-03-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Answer the following and rewrite the sentence****14**

- 1) The DNA replication in E.coli is \_\_\_\_\_.  
 a) Conservative and unidirectional  
 b) Conservative and bidirectional  
 c) Conservative and bidirectional  
 d) Semiconservative and bidirectional
- 2) Unwinding of DNA occurs due to the enzyme \_\_\_\_\_.  
 a) Topoisomerase  
 b) Helicase  
 c) Ligase  
 d) DNA Polymerase
- 3) Sigma factor is component of \_\_\_\_\_.  
 a) RNA polymerase  
 b) DNA ligase  
 c) DNA polymerase  
 d) Endonuclease
- 4) From the following \_\_\_\_\_ does not have introns.  
 a) DNA  
 b) Primary RNA transcript  
 c) Processed mRNA  
 d) rRNA
- 5) \_\_\_\_\_ is not involved in translation.  
 a) rRNA  
 b) siRNA  
 c) tRNA  
 d) SnRNA
- 6) \_\_\_\_\_ process does not occur in prokaryotes.  
 a) Transcription  
 b) Translation  
 c) Replication  
 d) Splicing
- 7) Short strands of \_\_\_\_\_ are used as primer for DNA synthesis.  
 a) DNA  
 b) RNA  
 c) Protein  
 d) SnRNA
- 8) The coding initiator site on DNA is \_\_\_\_\_.  
 a) AUG  
 b) ATG  
 c) UAA  
 d) UAG
- 9) The B - DNA has \_\_\_\_\_ base pairs per turn.  
 a) 12  
 b) 11  
 c) 10  
 d) 09
- 10) \_\_\_\_\_ is termination codon.  
 a) UAA  
 b) UUU  
 c) CUU  
 d) AAC
- 11) A tail is added to mRNA by the action of \_\_\_\_\_ enzyme.  
 a) RNA polymerase  
 b) DNA polymerase  
 c) Polyadenylate polymerase  
 d) RNA polymerase II

- 12) \_\_\_\_\_ is a DNA repair enzyme,  
 a) DNA polymerase III                      b) DNA polymerase I  
 c) DNA polymerase II                      d) Topoisomerase
- 13) Catabolite repression occurs when \_\_\_\_\_.  
 a) galactose is in higher amount  
 b) Lactose in higher amount  
 c) Glucose in higher amount  
 d) Glucose and lactose in higher amount
- 14) RNA polymerase I synthesis \_\_\_\_\_.  
 a) tRNA                                              b) mRNA  
 c) Sn RNA                                              d) rRNA

- Q.2 A) Answer the following. (Any Four) 08**  
 1) Enlist the enzymes of DNA replication,  
 2) What is DNA denaturation?  
 3) What is Operon?  
 4) Enlist the steps in protein synthesis.  
 5) What are heat shock proteins?
- B) Write notes on (Any Two) 06**  
 1) B-DNA  
 2) DNA Denaturation  
 3) Catabolite repression
- Q.3 A) Answer the following (Any Two) 08**  
 1) Explain the structure of m - RNA.  
 2) Describe the structure of Z DNA.  
 3) Explain the organization of DNA in eukaryotes.
- B) Answer the following (Any One) 06**  
 1) Describe the post translational modifications in protein.  
 2) Describe the process of DNA replication in prokaryotes.
- Q.4 A) Answer the following (Any Two) 10**  
 1) Describe the structure of Ribosomes.  
 2) Explain the Griffith experiment for DNA discovery.  
 3) Explain the difference between Prokaryotic and Eukaryotic DNA replication.
- B) Answer the following (Any One) 04**  
 1) Describe the structure of tRNA with suitable diagram.  
 2) Describe the structure of B - DNA.
- Q.5 Answer the following (Any Two) 14**  
 a) Describe the lactose operon with suitable diagram.  
 b) Explain the process of protein synthesis.  
 c) Describe the organization of DNA in eukaryotes.

**Seat  
No.**

Day & Date: Monday, 27-03-2023  
Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

## 14

- 1) Gastric HCl is secreted by \_\_\_\_\_.  
a) Oxyntic cells                      b) Serots cells  
c) Kuffer's cells                    d) R-Cells
- 2) Cardiac cycle required \_\_\_\_\_ time.  
a) 0.4 Sec                                 b) 0.2 Sec  
c) 0.3 Sec                                 d) 0.8 Sec
- 3) Mammalian urine is \_\_\_\_\_ to the blood.  
a) Isotonic                                  b) Hypotonic  
c) Hypertonic                              d) Dilute
- 4) Axon of all sensory neurons are classified as \_\_\_\_\_.  
a) Motor nerves                          b) Sensory nerves  
c) Mixed nerves                          d) rotator nerves
- 5) Exchange of O<sub>2</sub> & CO<sub>2</sub> of respiratory surface across through \_\_\_\_\_.  
a) Active Transport                      b) Passive Transport  
c) Diffusion                                 d) Osmosis
- 6) \_\_\_\_\_ Vitamin is water soluble.  
a) Vit A                                        b) Vit C  
c) Vit K                                        d) Vit D
- 7) Bowman's capsules are located in \_\_\_\_\_ region in kidney.  
a) Cortex                                      b) Medulla  
c) Pelvic                                        d) Calyx
- 8) O<sub>2</sub> is carried from lungs to each cell of human body in combination with \_\_\_\_\_.  
a) Hemoglobin                              b) Heparin  
c) Malanin                                    d) Tanin
- 9) In case, blood sugar level crosses the 100mg/ml of blood the condition is known\_\_\_\_\_.  
a) Glycaemia                                 b) Hyper glycaemia  
c) Homo glycaemia                         d) Hetero glycaemia
- 10) Glycogenolysis is process of breakdown of \_\_\_\_\_ to glucose.  
a) Glucose                                    b) Glycogen  
c) Galactose                                 d) Glycans
- 11) Sliding filament theory of muscle contraction firstly proposed by\_\_\_\_\_  
a) H.E. Huxley & Hanson                b) Necolson  
c) Watson                                      d) Robertson

- 12) \_\_\_\_\_ is the artificial process of removing wastes, excess salts & excess water from the blood.
- |                |                   |
|----------------|-------------------|
| a) Dialysis    | b) Diagnosis      |
| c) Deamination | d) Detoxification |
- 13) Blood Pressure in healthy person is \_\_\_\_\_ mmhg.
- |           |           |
|-----------|-----------|
| a) 140/60 | b) 80/120 |
| c) 120/80 | d) 90/80  |
- 14) Auricular systole lasts for about \_\_\_\_\_.
- |            |            |
|------------|------------|
| a) 0.1 Sec | b) 0.2 Sec |
| c) 0.3 Sec | d) 0.0 Sec |

**Q.2 A) Answer of the following. (Any Four) 08**

- 1) Heart Sound
- 2) Dialysis
- 3) S-A Node
- 4) Depolarization
- 5) Glycogenolysis

**B) Write short note on (any two) 06**

- 1) Chloride Shift
- 2) Sarcomere
- 3) Ornithine Cycle

**Q.3 A) Answer of the following (any two) 08**

- 1) CO<sub>2</sub> transport - Describe
- 2) Gastric Digestion
- 3) Ultra Structure Nephron - Explain,

**B) Answer the following (any one) 06**

- 1) Glycolysis - Explain
- 2) Explain synaptic transmission

**Q.4 A) Answer of the following (any two) 10**

- 1) Structure of neuron- Explain
- 2) Ornithine Cycle- Explain
- 3) Ultra Structure of striate muscle- explain

**B) Answer the following (any one) 04**

- 1) ECG - Describe
- 2) Vit K Sources, significance deficiency - Describe

**Q.5 Answer of the following (any two) 14**

- a) Describe molecular mechanism muscle contraction.
- b) Describe physiology of urine formation
- c) What are vitamin? Describe in details fat soluble vitamin with respect to source consequences and physiological role.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov - 2022**  
**MATHEMATICS (Special Paper - XIII)**  
**Metric Spaces**

Day & Date: Monday, 27-03-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

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

**14**

- 1) The Metric Space  $\langle R, d \rangle$  is called \_\_\_\_\_ Metric.
  - a) Normal
  - b) Discreet
  - c) Absolute
  - d) None of these
- 2) If  $A$  and  $B$  are closed subset  $R$  then  $A \times B$  is called subset of \_\_\_\_\_.
  - a)  $A$
  - b)  $B$
  - c)  $R^2$
  - d)  $R^3$
- 3) The subset  $\{1, 1/2, 1/3, \dots\}$  of the real has \_\_\_\_\_ as a limit of
  - a) 0
  - b)  $1/2$
  - c)  $1/3$
  - d)  $1/4$
- 4) Every convergent sequence in Metric space is \_\_\_\_\_.
  - a) Convergent
  - b) Divergent
  - c) Cauchy Sequence
  - d) None of these
- 5) Every Compact Metric space is \_\_\_\_\_.
  - a) complete and not bdd
  - b) bounded and not complete
  - c) not complete & not bdd
  - d) compact and totally bounded
- 6)  $M$  has a Heine - Borel property of  $M$  is \_\_\_\_\_.
  - a) Compact
  - b) Complete
  - c) Connected
  - d) Not bounded
- 7) If  $A$  is not bounded then  $\text{diam } A =$  \_\_\_\_\_.
  - a) 1
  - b) 2
  - c)  $-\infty$
  - d)  $\infty$
- 8) If  $\langle M, \rho \rangle$  is a complete Metric space &  $A$  is closed subset of  $M$  then  $\langle A, \rho \rangle$  is also \_\_\_\_\_.
  - a) Complete
  - b) Compact
  - c) Connected
  - d) Not bounded
- 9) Any polynomial function is \_\_\_\_\_ at each point in  $R'$ .
  - a) Not continuous
  - b) Continuous
  - c) Not bounded
  - d) Closed
- 10) If  $E$  is subset of Metric space  $M$  then  $E$  is closed subset of  $M$  if \_\_\_\_\_.
  - a)  $E > \bar{E}$
  - b)  $E < \bar{E}$
  - c)  $E = \bar{E}$
  - d)  $E \neq \bar{E}$
- 11) If  $f: R' \rightarrow R'$  and  $a \in R'$ , if  $f$  is continuous at  $a$  then
  - a)  $w[f, a] > 0$
  - b)  $w[f, a] < 0$
  - c)  $w[f, a] \neq 0$
  - d)  $w[f, a] = 0$



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper – XIII)**  
**Statistical Inference – II**

Day & Date: Monday, 27-03-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Choose most appropriate alternative from those given in each case** **14**

- 1) If  $p$  - value is  $< \alpha(1.05)$ 
  - a) we reject  $H_0$  at  $\alpha$
  - b) we accept  $H_0$  with  $\alpha$
  - c) we reject  $H_0$  at  $(1 - \alpha)$
  - d) we accept  $H_0$  with  $(1 - \alpha)$
- 2) Power function of a test is related to \_\_\_\_\_.
  - a) Type I error
  - b) Type II error
  - c) both (a) and (b)
  - d) neither (a) nor (b)
- 3) The decision criterion of SPRT depends on \_\_\_\_\_.
  - a) Type I error
  - b) Type II error
  - c) both (a) and (b)
  - d) neither (a) nor (b).
- 4) LRT for equality of two population variances of normal distribution reduces to \_\_\_\_\_ test.
  - a)  $t$
  - b)  $\chi^2$
  - c)  $F$
  - d)  $Z$
- 5) Which of the following is applicable for paired data?
  - a) Sign test
  - b) signed rank test
  - c) median test
  - d) (a) and (b)
- 6) A wrong decision about null hypothesis leads to \_\_\_\_\_.
  - a) Type I error
  - b) Type two error
  - c) both (a) and (b)
  - d) neither (a) nor (b)
- 7) If  $X$  is  $\exp(\theta)$ , then 95% central confidence limit for large  $n$  are \_\_\_\_\_.
  - a)  $\left(1 \pm \frac{1.96}{\sqrt{n}}\right) \bar{X}$
  - b)  $\frac{\left(1 \pm \frac{1.96 \bar{X}}{\sqrt{n}}\right)}{\bar{X}}$
  - c)  $\frac{\left(1 \pm \frac{1.96}{\sqrt{n}}\right)}{\bar{X}}$
  - d) None of these
- 8) In SPRT decision about the null hypothesis  $H_0$  is taken \_\_\_\_\_.
  - a) after each successive observation
  - b) After a fixed number of observations
  - c) after at least 5 observations
  - d) none of these



**Q.4 A) Answer any two from the following. 10**

- 1) Let  $X_1, X_2, \dots, X_n$  and  $Y_1, Y_2, \dots, Y_m$  be random samples of sizes  $n$  and  $m$  respectively from  $N(\mu_1, \sigma_1^2)$  and  $N(\mu_2, \sigma_2^2)$ .

Obtain  $100(1 - \alpha)\%$  confidence interval for  $\frac{\sigma_1^2}{\sigma_2^2}$ .

- 2) Explain Mann-Whitney U test.  
 3) Given the SPRT for testing  $H_0: \theta = \theta_0$  V/s  $H_1: \theta = \theta_1 (> \theta_0)$ , in sampling from a  $P(\theta)$  distribution.

**B) Answer any one from the following. 04**

- 1) Write a note on Kolmogorov-Smirnov test for one sample.  
 2) Discuss the advantages and disadvantages of non-parametric tests.

**Q.5 Attempt any two from the following. 14**

- a) Explain the procedure of Wald's SPRT and construct SPRT for testing  $H_0: \theta = \theta_0$  V/s  $H_1: \theta = \theta_1 (> \theta_0)$ , in sampling from  $\exp(\theta)$  distribution.  
 b) State and prove Neyman-Pearson Lemma.  
 c) Give the assumptions of non-parametric tests and explain the procedure of Wilcoxon's signed rank test.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Monday, 27-03-2023  
Time: 03:00 PM To 05:30 PM

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

14

- 1) The type of vein commonly found in igneous rocks is \_\_\_\_\_.  
a) Fissure-veins                      b) Ladder-veins  
c) Gash-veins                         d) Stock works
- 2) Chromite is mostly of which origin?  
a) Igneous                                b) Sedimentary  
c) Metamorphic                        d) Any origin
- 3) Generally tourmaline-rich rocks are products of \_\_\_\_\_.  
a) Metamorphism  
b) Metasomatism  
c) Magmatic crystallisation  
d) Oxidation and supergene enrichment.
- 4) Hutti gold mines are located in which state of India?  
a) Karnataka                            b) Madhya Pradesh  
c) Sikkim                                 d) Bihar
- 5) Most of the bauxite deposits of central and western India have been formed from:  
a) Granite                                b) Syenite  
c) Nepheline Syenite                  d) Basalt
- 6) 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
- 7) The ore deposits formed due to weathering do not form any metallogenic epoch \_\_\_\_\_ because:  
a) Weathering is not ore forming process.  
b) The process of weathering as operated at all times in the earth's history.  
c) Weathering cannot form ore deposits.  
d) Weathering process includes both chemical and mechanical processes.
- 8) Prospecting by geophysical methods is based on the typical properties exhibited by rock formations like \_\_\_\_\_.  
a) Electrical, magnetic and gravitational  
b) Electrical and magnetic  
c) Magnetic and gravitational  
d) None of these

- 9) Torsion balance surveys are conducted for:  
 a) Gravity prospecting                      b) Magnetic prospecting  
 c) Electrical prospecting                  d) Seismic prospecting.
- 10) The minerals from which one or more metals can be extracted economically are called as \_\_\_\_\_ minerals.  
 a) ore                                              b) industrial  
 c) secondary                                  d) important
- 11) Bauxite is \_\_\_\_\_ concentration deposit rich in Al.  
 a) Rudaceous                                  b) Residual  
 c) Arenaceous                                d) Hydrothermal
- 12) Self potential method is the most suitable method for prospecting of:  
 a) Carbonates.                                b) Sulphide ore  
 c) Ferruginous ores                          d) None of these.
- 13) Iron is commonly precipitated as \_\_\_\_\_.  
 a) Siderite                                      b) Limonite  
 c) Hematite                                    d) All the above
- 14) Which of the following geological criteria is used for placer deposits  
 a) Magmagenic criteria                      b) Structural criteria  
 c) Climatic criteria                            d) All of the above

**Q.2 A) Answer the following (Any Four) 08**

- 1) Define prospecting.
- 2) What is gauge minerals?
- 3) Give essential conditions for the placer deposits
- 4) Name two geological criteria for prospecting Iron deposits.
- 5) Name the types of magmatic concentration.

**B) Write notes on. (Any Two) 06**

- 1) Mineralogical guide for ore deposits
- 2) Saddle reef
- 3) Three objectives of National Mineral Policy.

**Q.3 A) Answer the following (Any Two) 08**

- 1) Formation of laterites.
- 2) Correction of data for gravity method.
- 3) Climatic criteria of geological prospecting

**B) Answer the following (Any One) 06**

- 1) Discuss the self potential method.
- 2) Write the brief note on manganese deposits of India.

**Q.4 A) Answer the following (Any Two) 10**

- 1) Explain the oxidation and supergene enrichment processes of ore deposit with Indian example.
- 2) Discuss in short the applications of magnetic method.
- 3) Describe the tenor of ore.

**B) Answer the Following (Any One) 04**

- 1) Conservation of minerals, give examples.
- 2) Fissure vein deposit.

**Q.5 Answer the following (Any Two)****14**

- a)** Discuss the origin and distribution of copper deposits of India.
- b)** Describe the field procedure of seismic refraction method with interpretation.
- c)** Explain in detail the mechanical concentration of ore deposits.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Special Paper - XIII)**  
**Microbial Genetics**

Day & Date: Monday, 27-03-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Rewrite the following sentences by choosing correct alternatives from given below. 14**

- 1) In DNA replication unwinding of DNA is carried out by \_\_\_\_\_ enzyme.
  - a) Topoisomerase
  - b) Primase
  - c) Helicase
  - d) DNA polymerase
- 2) Genetic complementation test in the rII region of phage T4 developed by \_\_\_\_\_.
  - a) S. Benzer
  - b) S. Altman
  - c) Griffith
  - d) Watson
- 3) \_\_\_\_\_ provide the binding site for RNA polymerase in operon.
  - a) Promoter
  - b) Operator
  - c) Repressor
  - d) Inducer
- 4) A base pair substitution mutation that changes a codon specifying an amino acid into a stop codon is called as \_\_\_\_\_ mutation.
  - a) Missense
  - b) Non sense
  - c) Frame shift
  - d) Deletion
- 5) \_\_\_\_\_ enzyme which add phosphate moiety at either 5'end or 3'end of DNA in gene manipulation.
  - a) S1 nuclease
  - b) Polynucleotide kinase
  - c) Phosphatase
  - d) RNase H
- 6) If a particular short DNA sequence is AGATTC, the corresponding mRNA sequence will be \_\_\_\_\_.
  - a) AGATTC
  - b) TCTAAG
  - c) AGAUUC
  - d) UCUAAG
- 7) The restoration of function by a second mutation at a different site in the same gene is called \_\_\_\_\_.
  - a) Back mutation
  - b) Conditional lethal
  - c) Intragenic suppression
  - d) intergenic suppression
- 8) DNA fingerprinting technique was developed by \_\_\_\_\_.
  - a) Francis crick
  - b) H. Khurana
  - c) Alec Jeffrey
  - d) James Watson
- 9) \_\_\_\_\_ type of restriction enzyme most commonly used in r-DNA technology.
  - a) Type I
  - b) Type II
  - c) Type III
  - d) Type IV

- 10) \_\_\_\_\_ is not a structural gene of Lac operon.
  - a) Lac Z
  - b) Lac Y
  - c) Lac A
  - d) Lac I
- 11) In the Lac-operon the genes in the operon are \_\_\_\_\_.
  - a) always expressed
  - b) expressed only when lactose is present
  - c) never expressed
  - d) only expressed when lactose is absent
- 12) DNA replication by semiconservative mode in *E.coli* was experimentally proved by \_\_\_\_\_.
  - a) Watson and Crick
  - b) Meselson and Stahl
  - c) Zinder and Lederberg
  - d) Delbruck and Ellis
- 13) Vectors designed to replicate in two different species is called as \_\_\_\_\_ vector.
  - a) Phasmid
  - b) Phagemid
  - c) Shuttle
  - d) Transfer
- 14) \_\_\_\_\_ type of gel electrophoresis most commonly used for separation of large DNA fragments.
  - a) PAGE
  - b) SDS PAGE
  - c) Agarose
  - d) 2D PAGE

**Q.2 A) Answer the following questions. (Any Four)** **08**

- 1) Define Semi conservative DNA replication.
- 2) Give the role of DNA polymerase I.
- 3) How cyclic AMP is formed? Give its significance.
- 4) Give the significance of phenotypic lag in isolation of auxotrophic mutants.
- 5) What are Restriction endonucleases. Give their use.

**B) Answer the following questions. (Any Two)** **06**

- 1) Define adaptor & Give its use.
- 2) Define Okazaki fragments.
- 3) Define Cosmids.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Define DNA fingerprinting. Discuss in brief steps involved in DNA fingerprinting.
- 2) Write briefly on folded fiber model of *E.coli* chromosome.
- 3) Give brief account of frame shift mutations.

**B) Answer the following questions. (Any One)** **06**

- 1) Write brief account DNA Polymerase III enzyme.
- 2) Describe in detail the applications of Bioinformatics.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Discuss in detail Negative and Positive regulation of Lac operon.
- 2) Describe in detail Mechanism of transcription in prokaryotes.
- 3) Give brief account of techniques in Genetic engineering.

**B) Answer the following questions. (Any One)** **04**

- 1) Give an account of base pair substitution mutations.
- 2) Give brief account of Restriction Endonucleases enzymes.

**Q.5 Answer the following questions. (Any Two)****14**

- a)** Describe in detail Mechanism of DNA replication.
- b)** Write briefly on Applications of protein engineering.
- c)** Describe briefly the time course of phenotypic expression of mutation.

**Seat  
No.**

**P**

Day & Date: Monday, 27-03-2023  
Time: 03:00 PM To 05:30 PM

**Instructions:**

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

14

- Page 1 of 2

- 10) \_\_\_\_\_ is used as a DC to DC converter.
  - a) Rectifier
  - b) Inverter
  - c) Chopper
  - d) Cyclo-converter
- 11) The series inverter uses \_\_\_\_\_ type of commutation.
  - a) Class A
  - b) Class B
  - c) Class C
  - d) Class D
- 12) If firing angle of SCR is  $45^\circ$  then conduction angle is \_\_\_\_\_.
  - a)  $45^\circ$
  - b)  $110^\circ$
  - c)  $135^\circ$
  - d)  $145^\circ$
- 13) \_\_\_\_\_ is unidirectional device.
  - a) TRIAC
  - b) DIAC
  - c) SBS
  - d) SCR
- 14) The UJT may be used as \_\_\_\_\_.
  - a) Saw tooth oscillator
  - b) triggering device
  - c) Negative resistance device
  - d) all of these

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) What is the need of heat sink?
- 2) Write classification of Choppers.
- 3) Draw the construction diagram and symbol of PUT.
- 4) State the principle of DC motor.
- 5) State any two advantages of IGBT.

**B) Write notes. (Any Two) 06**

- 1) Power diode
- 2) Static Induction Transistor
- 3) UPS

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Explain switching characteristics of power BJT.
- 2) Explain two transistor analogy of SCR.
- 3) Explain working of flasher circuit.

**B) Answer the following questions. (Any One) 06**

- 1) Describe single phase half wave controlled rectifier with resistive load.
- 2) Explain working of parallel inverter using SCR.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Define GTO, and explain its construction. What are the applications of GTO?
- 2) With the help of neat circuit diagram explain operation of Jones chopper.
- 3) Explain single phase full wave controlled rectifier with resistive load.

**B) Answer the following questions. (Any One) 04**

- 1) With suitable diagram explain emergency lighting system.
- 2) Describe construction and working of IGBT with suitable diagram.

**Q.5 Answer the following questions. (Any Two) 14**

- a) What is SCR triggering? What are its types? Explain any one of them.
- b) Explain construction and switching characteristics of power MOSFET.
- c) Draw circuit diagram of three phase full wave controlled rectifier with Resistive load and explain its operation.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Monday, 27-03-2023  
Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

14

- 1) Which of the following control provides a link for unauthenticated users to log on?  
a) Login  
b) Login View  
c) LoginStatus  
d) LoginName
- 2) How many types of authentication ASP.NET supports?  
a) Windows Authentication.  
b) .NET Passport Authentication.  
c) Forms Authentication.  
d) All of the above
- 3) Which control is required for every page that has AJAX Extensions for ASP.NET?  
a) Update Panel  
b) Script Manager  
c) Content Panel  
d) None of the above
- 4) Which of the following server control shows data in a tabular format and allows sorting, paging, edit, delete each record?  
a) List Box  
b) GridView  
c) Repeater  
d) None of these above
- 5) Which of the following control is used to validate that two fields are equal?  
a) RegularExpressionValidator  
b) CompareValidator  
c) equals () method  
d) RequiredFieldValidator
- 6) Choose the form in which Postback occur.  
a) HTMLForms  
b) Webforms  
c) Win forms  
d) None of these
- 7) Which of the following denote the web control associated with Table control function of ASP.NET?  
a) DataList  
b) ListBox  
c) TableRow  
d) All the Above
- 8) Which of the following denote ways to manage state in an ASP.Net Application?  
a) Session objects  
b) Application objects  
c) View State  
d) All the Above
- 9) Select the type Processing model that asp.net simulate.  
a) Event-driven  
b) Static  
c) Linear  
d) Top down
- 10) Attribute must be set on a validator control for the validation to work.  
a) ControlToValidate  
b) ControlToBind  
c) ValidateControl  
d) Validate

- 11) Where do we include the user lists for windows authentication?
  - a) < Credential>
  - b) < authorization>
  - c) < identity>
  - d) < authentication>
- 12) Which of the following languages can be used to write server side scripting In ASP.NET?
  - a) C-sharp
  - b) VB
  - c) C++
  - d) A and B
- 13) Which control is required inside a content page to reference ContentPlaceHolder control inside the master page?
  - a) Content control on a content page
  - b) ContentPlaceHolder on a content page
  - c) Placeholder control is required on content page
  - d) None of the above
- 14) ASP.NET separates the HTML output from program logic using a feature named as \_\_\_\_\_.
  - a) Exception
  - b) Code-behind
  - c) Code-front
  - d) None of the above

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) What is AJAX?
- 2) What is Data Adapter?
- 3) Define Validation?
- 4) What is exception handling?
- 5) List out the event in life cycle of webpage.

**B) Write note. (Any Two) 06**

- 1) Explain session state?
- 2) What is Script Manager in AJAX?
- 3) Explain cross page posting with example.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Explain any folder in asp.net.
- 2) Explain ASP.Net tracing in detail.
- 3) Explain Radio Button & checkbox with example.

**B) Answer the following questions. (Any One) 06**

- 1) Explain any two validation control with example.
- 2) What is cookies & Explain type of cookies in brief?

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Write difference between asp & asp.net.
- 2) What is ADO.net? Explain How to connect to database?
- 3) Explain Tree view & Menu view control.

**B) Answer the following questions. (Any One) 04**

- 1) Explain Update Panel & Timer Control in AJAX.
- 2) Explain compilation with suitable block diagram.

**Q.5 Answer the following questions. (Any Two) 14**

- a) What are the components of ASP.Net AJAX architecture?
- b) Define Authentication & Explain its type in detail.
- c) What is master page & Explain the relationship between master page & content page?

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov - 2022**  
**PHYSICS (Special Paper- XIV)**  
**Materials Science**

Day & Date: Monday, 06-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

- 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 the correct alternatives from the options.****14**

- 1) \_\_\_\_\_ Structure can be studied by naked eye.
  - a) Atomic
  - b) Grain
  - c) Micro
  - d) Macro
- 2) Applied Force per unit Cross Sectional Area is called \_\_\_\_\_.
  - a) Stress
  - b) Strain
  - c) Creep
  - d) Ductility
- 3) Time dependent permanent deformation is called \_\_\_\_\_.
  - a) Elasticity
  - b) Creep
  - c) Plasticity
  - d) Fatigue
- 4) The dielectric Strength is function is of \_\_\_\_\_.
  - a) Thickness
  - b) Length
  - c) Charge
  - d) None of these
- 5) Bakelite is obtained by reaction of Formaldehyde with \_\_\_\_\_.
  - a) Phenol
  - b) Styrene
  - c) Ethane
  - d) Urea
- 6) \_\_\_\_\_ Polymers occurs naturally.
  - a) Nylon
  - b) Starch
  - c) PVC
  - d) Teflon
- 7) The degree of polymerization is the ratio of molecular weight of polymer to \_\_\_\_\_.
  - a) Molecular weight of monomer
  - b) Atomic weight of monomer
  - c) Atomic weight of polymer
  - d) None of these
- 8) \_\_\_\_\_ materials of combination of two or more materials which have different properties from constituent materials.
  - a) Polymer
  - b) Crystalline
  - c) Composite
  - d) Amorphous
- 9) Cermets are example of \_\_\_\_\_.
  - a) Micro composite
  - b) Continuous fiber composites
  - c) Short fibre composites
  - d) Large particle composites
- 10) Strength of Composite is \_\_\_\_\_.
  - a) Low
  - b) High
  - c) Zero
  - d) Infinite



- 11) Oxide ceramics are \_\_\_\_\_ materials.
  - a) Insulator
  - b) Conductor
  - c) Polymer
  - d) Monomer
- 12) \_\_\_\_\_ technique is used to determine the crystal structure of materials.
  - a) SEM
  - b) XRD
  - c) FTIR
  - d) UV-VIS
- 13) \_\_\_\_\_ prepared and explained carbon nanotubes for first time.
  - a) Richard Feynman
  - b) Richard Smalley
  - c) Eric Drexler
  - d) Sumia Iijima
- 14) \_\_\_\_\_ materials have occupied an important role in bone repairing materials in the medical field.
  - a) Bioactive glasses and glass ceramics
  - b) Polymers
  - c) Composites
  - d) Nanomaterials

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) What is biomechanism?
- 2) What are composites important in nature?
- 3) Define polymerization mechanism.
- 4) Define i) Fatigue ii) Hardness
- 5) Give any four examples of ceramics.

**B) Write short notes. (Any Two) 06**

- 1) Write applications of nanomaterials.
- 2) Give classification of ceramics.
- 3) Explain any one ceramic structure.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Write note on ceramic processing.
- 2) Explain the properties of composites.
- 3) What are biomaterials? Explain biocomposite materials.

**B) Answer the following questions. (Any One) 06**

- 1) Explain in details classification of nano-structured materials.
- 2) Explain particle & fibre reinforced composites.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Explain mechanical, electrical and magnetic properties of materials.
- 2) Write a note on thermosetting & thermoplastic polymers.
- 3) Explain physical methods synthesis of nanomaterials.

**B) Answer the following questions. (Any One) 04**

- 1) Explain properties & applications of biomaterials.
- 2) Explain chemical bath deposition method of formation of thin film.

**Q.5 Answer the following questions. (Any Two) 14**

- a) Explain classification of materials.
- b) Discuss various methods of fabrication of polymers in details.
- c) Discuss various techniques of characterization of nanostructured materials.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination Oct/Nov - 2022**  
**Chemistry (Special Paper - XIV)**  
**Inorganic Chemistry**

Day &amp; Date: Monday, 06-02-2023

Max. Marks: 70

Time: 03:00 PM To 05:30 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 Choose correct alternatives from the following options.****14**

- 1) In  $\text{Be}(\text{CH}_3)_2$ , the bonding is best described by \_\_\_\_\_ bonds.
  - a)  $3c - 2e$
  - b)  $2c - 3e$
  - c)  $2c - 2e$
  - d)  $4c - 2e$
- 2) Organometallic compounds of Aluminium are \_\_\_\_\_.
  - a) Polymeric species
  - b) Molecular species
  - c) Ionic species
  - d) Coordinate species
- 3) \_\_\_\_\_ is essential for corrosion.
  - a) Solid
  - b) Liquid
  - c) Gas
  - d) Water
- 4) In corrosion phenomenon \_\_\_\_\_ gas is evolved from the surface of cathode.
  - a) Oxygen
  - b) Nitrogen
  - c) Carbon dioxide
  - d) Hydrogen
- 5) In  $\text{XeO}_4$  molecule Xenon undergoes \_\_\_\_\_ hybridization.
  - a)  $sp^2d$
  - b)  $sp^3d^2$
  - c)  $sp^3d$
  - d)  $sp^3$
- 6) In the valence shell of diborane there are \_\_\_\_\_ electrons.
  - a) 14
  - b) 12
  - c) 10
  - d) 8
- 7) In  $\text{XeF}_2$ , bond length for Xe-F is \_\_\_\_\_ pm.
  - a) 195
  - b) 190
  - c) 185
  - d) 200
- 8) \_\_\_\_\_ is called as inorganic benzene.
  - a) Diborane
  - b) Borazine
  - c) Xenodifluoride
  - d) Ethane
- 9) Ceramic superconductors are also called \_\_\_\_\_ superconductors.
  - a) 321
  - b) 121
  - c) 123
  - d) 131
- 10) Germanium doped with donor atom is called \_\_\_\_\_.
  - a) Mixed oxide conductor
  - b) n-type semiconductor
  - c) p-type semiconductor
  - d) Super conductor
- 11) Transuranic elements are also called as \_\_\_\_\_ elements.
  - a) S-block
  - b) P-block
  - c) Manmade
  - d) Lanthanide
- 12) In lanthanide series differentiating electrons are added in \_\_\_\_\_.
  - a) 4f sub shell
  - b) (n-2) sub shell
  - c) 3f sub shell
  - d) 5f sub shell

- 13) Most of the lanthanons shows \_\_\_\_\_ oxidation state.  
a) + V  
b) + III  
c) + IV  
d) + VI
- 14) Superconductors shows \_\_\_\_\_ effect.  
a) Resonance  
b) Raman  
c) Meissner  
d) Trans

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Define transuranic elements.
- 2) Why metal shows good lustre?
- 3) Draw the structure of  $P_4^{4-}$ .
- 4) Define immersed corrosion.
- 5) Draw geometrical structure of  $XeF_6$ .

**B) Write notes on. (Any Two)** **06**

- 1) Mononuclear carbonyl and terminal carbonyl.
- 2) Mechanical Properties of metal.
- 3) Give the IUPAC nomenclature of super heavy elements with atomic number 102, 111 and 107.

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Explain the structure of  $\text{XeO}_4$ .
- 2) Discuss the structure of alkyl and aryl compounds of lithium.
- 3) What is TU elements? Explain the preparation of transuranium elements by bombardment with accelerated projectile method.

**B) Answer the following questions. (Any One)** **06**

- 1) Give the name, symbol and electronic configuration of lanthanides.
- 2) What are semiconductors? Explain extrinsic semiconductors in detail.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Describe the structure of diborane.
- 2) Explain methods of protection of metals from corrosion.
- 3) Discuss preparation and properties of alkyl aluminium compounds.

**B) Answer the following questions. (Any One)** **04**

- 1) Explain classification of solids based on band theory.
- 2) Discuss the effect of purity of metals on corrosion.

**Q.5 Answer the following questions. (Any Two)** **14**

- 1) What is lanthanide? Explain in detail ion exchange method used for separation of lanthanide.
- 2) Discuss the properties of metals.
- 3) Draw and explain the structure of  $P_4O_{10}$ .

|  |
|--|
|  |
|--|

Day & Date: Monday, 06-02-2023  
Time: 03:00 PM To 05:30 PM

**Instructions:**

- 1) All questions are compulsory.
- 2) Figures to the right indicate full marks.
- 3) Neat diagrams must be drawn wherever necessary.
- 4) All questions carry equal marks.

14

- Page 1 of 2

- 12) Haploid plants can be obtained from \_\_\_\_\_.  
a) Bud culture                                      b) Root culture  
c) Leaf culture                                     d) anther culture
- 13) In plant tissue culture \_\_\_\_\_ part shows maximum totipotency.  
a) Stem                                                b) Xylem  
c) Phloem                                          d) Meristem
- 14) Protoplast can be produced from suspension cultures, callus tissue or intact tissues by enzymatic treatments with \_\_\_\_\_.  
a) Cellulolytic enzymes                        b) Pectolytic enzymes  
c) Both cellulolytic & pectolytic            d) Proteolytic enzymes

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Define plasmid.
- 2) Define chimeric DNA.
- 3) What is electroporation.
- 4) Define transgenic plants.
- 5) Enlist enzymes involved in rDNA technology.

**B) Write notes on. (Any Two)** **06**

- 1) Cosmids
- 2) Totipotency.
- 3) Anther culture.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Process of DNA figure printing.
- 2) Micro injection method of gene delivery.
- 3) Explain in brief somatic hybridization.

**B) Answer the following questions. (Any One)** **06**

- 1) Write on DNA libraries.
- 2) Describe southern blotting technique.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Explain in detail gene gun method of gene delivery.
- 2) Describe method of anther culture.
- 3) Describe the method of bacterial transformation.

**B) Answer the following questions. (Any One)** **04**

- 1) Enlist the achievements in plant biotechnology.
- 2) Transgenic plants with insect resistance.

**Q.5 Answer the following questions. (Any Two) 14**

- Explain in detail any two types of vectors studied by you.
- Describe in detail the process of protoplast culture.
- Describe PCR with its applications.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov- 2022**  
**ZOOLOGY (Special Paper- XIV)**  
**Economic Zoology**

Day & Date: Monday, 06-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Choose the correct alternatives from the options.****14**

- 1) In Indian major carp Catla is \_\_\_\_\_ feeder.
  - a) Surface
  - b) Middle
  - c) middle as well as bottom
  - d) bottom
- 2) Crustacean fishery consists of \_\_\_\_\_.
  - a) sole, tuna, pomphret
  - b) sardine, mackerel
  - c) lobster, crab, shrimp
  - d) mackerel, sole, sardine
- 3) \_\_\_\_\_ is called falling nest?
  - a) Trawl net
  - b) Drift net
  - c) Rampani
  - d) Cast net
- 4) Fish liver oil mainly consists of \_\_\_\_\_.
  - a) Vit. A and D
  - b) Vit. B and C
  - c) Vit. C
  - d) Vit. B only
- 5) Anadromous migration in fish means \_\_\_\_\_.
  - a) Adult fish live in sea and migrate into freshwater to spawn
  - b) Adult fish live in freshwater migrate to salt water to spawn
  - c) Adult fish live in salt water migrate to estuarine water to spawn
  - d) Adult fish live in freshwater migrate to estuarine water to spawn
- 6) \_\_\_\_\_ is the polyphagous pest.
  - a) Pyrilla
  - b) Tribolium
  - c) Cotton ball worm
  - d) Grass hopper
- 7) The intraspecific semiochemicals are known as \_\_\_\_\_.
  - a) Hormones
  - b) pheromones
  - c) Proteomones
  - d) carbomones
- 8) Which method used at least in integrated Pest Management (IPM) \_\_\_\_\_.
  - a) physical control method
  - b) chemical control method
  - c) cultural control method
  - d) biological control method
- 9) Brood pouch is found in male of \_\_\_\_\_ fish.
  - a) hippocampus
  - b) catla
  - c) Sardine
  - d) mackerel
- 10) Skin of shark fish is used for preparation of \_\_\_\_\_.
  - a) plagreen
  - b) shagreen
  - c) somgreen
  - d) solgreen
- 11) \_\_\_\_\_ silk moth species is native of Assam.
  - a) Mulberry silk moth
  - b) Tassar silk moth
  - c) Muga silk moth
  - d) Oak silk moth

- 12)** Pebrine is \_\_\_\_\_ disease of silkworm.  
a) Bacterial  
b) Protozoan  
c) Viral  
d) Fungal
- 13)** Silk is secretion of caterpillar larva from its specialized \_\_\_\_\_.  
a) poison gland  
b) Spiracle  
c) salivary gland  
d) malpighian tubules
- 14)** Pearl is made up of \_\_\_\_\_.  
a) calcium carbonate  
b) calcium oxylate  
c) calcium phorit  
d) calcium sulphate

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Sardine.
- 2) Tuna fish.
- 3) Raft.
- 4) Gill net.
- 5) Pyrilla.

**B) Write short notes. (Any Two)** **06**

- 1) Tribolium Jowar grain borer
- 2) Integrated Pest Management.
- 3) Silk worm rearing appliances

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Flacheries silk worm disease.
- 2) Wood borer pest.
- 3) Crustacean fishery.

**B) Answer the following questions. (Any One)** **06**

- 1) Silk worm rearing house.
- 2) Economics importance of fish products.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Describe trawl net and rampani net.
- 2) Parental care in fishes.
- 3) Explain cotton ball worm as pet of cotton.

**B) Answer the following questions. (Any One)** **04**

- 1) Green muscardine.
- 2) Biological control method of crop pest.

**Q.5 Answer the following questions. (Any Two)** **14**

- Write in brief about pearl culture and its applications.
- Describe offshore fishery.
- Explain inland fishery.

**Seat  
No.**

## Max. Marks: 70

14

- Page 1 of 3



- 11) The Simpson's one-third rule obtained by  $n = \underline{\hspace{2cm}}$  in general Quadrature formula.
- a) 1  
c) 3
- b) 2  
d) 4
- 12) If
- |         |   |     |     |
|---------|---|-----|-----|
| $x:$    | 0 | 0.5 | 1   |
| $f(x):$ | 1 | 0.8 | 0.5 |
- Then using Trapezoidal rule the value  $\int_0^1 f(x)dx$  is \_\_\_\_\_
- a) 0.757  
c) 0.775
- b) 0.717  
d) 0.771
- 13) The solution of  $(E - 1)^3 u_n = 0$  is \_\_\_\_\_
- a)  $u_n = c_1 n + c_2 n^2 + c_3 n^3$   
c)  $u_n = c_1(1)^n + c_2(2)^n + c_3(3)^n$
- b)  $u_n = c_1 + c_2 n + c_3 n^2$   
d)  $u_n = c_1 + c_2(-n) + c_3(-n)^2$
- 14) The Particular Integral of  $u_{n+2} - 5u_{n+1} - 6u_n = 4^n$  is \_\_\_\_\_
- a)  $-\frac{4^n}{10}$   
c)  $\frac{n^4}{10}$
- b)  $\frac{4^n}{10}$   
d)  $-\frac{n^4}{10}$

**Q.2 A) Answer the following questions. (Any Four)**

08

- 1) Prove that  $\Delta^3 y_2 = \nabla^3 y_5$
- 2) Evaluate  $\Delta^2(a b^{cx})$
- 3) State the Newton's Backward interpolation formula.
- 4) State the Trapezoidal rule.
- 5) State  $\Delta^2 u_n + 2\Delta u_2 + u_n = 0$

**B) Answer the following questions. (Any Two)**

06

- 1) Solve  $y_{p+3} - 3y_{p+2} + 3y_{p+1} - y_p = 1$
- 2) Evaluate  $\int_0^1 \frac{dx}{1+x}$  by Simpson's (1/3)<sup>rd</sup> rule by  $h = \frac{1}{4}$
- 3) Find the missing term in following data by using interpolation.

|       |   |   |   |   |    |
|-------|---|---|---|---|----|
| $x$ : | 0 | 1 | 2 | 3 | 4  |
| $y$ : | 1 | 3 | 9 | — | 81 |

**Q.3 A) Answer the following questions. (Any Two)**

08

- 1) Find the cubic polynomial which takes following values.

|         |   |   |   |    |
|---------|---|---|---|----|
| $x:$    | 0 | 1 | 2 | 3  |
| $f(x):$ | 1 | 2 | 1 | 10 |

- 2) Prove that  $\mu = \frac{2+\Delta}{2\sqrt{1+\Delta}} = \sqrt{1 + \frac{\delta^2}{4}}$
- 3) Give that:

|       |       |       |       |       |       |       |        |
|-------|-------|-------|-------|-------|-------|-------|--------|
| $x$ : | 1.0   | 1.1   | 1.2   | 1.3   | 1.4   | 1.5   | 1.6    |
| $y$ : | 7.989 | 8.403 | 8.781 | 9.129 | 9.451 | 9.750 | 10.030 |

Find  $\frac{dy}{dx}$  at  $x = 1.1$

**B) Answer the following questions. (Any One)****06**

- 1) State and prove Newton's forward interpolation formula.
- 2) Use Simpson's  $1/3^{\text{rd}}$  rule to find  $\int_0^{0.6} e^{-x^2} dx$  by taking seven ordinates.

**Q.4 A) Answer the following questions. (Any Two)****10**

- 1) Prove that  $\nabla y_{n+1} = h \left( 1 + \frac{1}{2} \nabla + \frac{5}{12} \nabla^2 + \dots \right) y'_n$
- 2) Find the maximum and minimum value of  $y$  from the following data:

|      |    |       |   |       |   |       |    |
|------|----|-------|---|-------|---|-------|----|
| $x:$ | -2 | -1    | 0 | 1     | 2 | 3     | 4  |
| $y:$ | 2  | -0.25 | 0 | -0.25 | 2 | 15.75 | 56 |

- 3) Solve  $y_{n+2} + 5y_{n+1} + 6y_n = n + 2^n$

**B) Answer the following questions. (Any One)****04**

- 1) Prove that  $\delta = \Delta (1 + \Delta)^{-1/2} = \nabla (1 - \nabla)^{-1/2}$
- 2) Using Lagrange's formula express the function  $\frac{3x^2 + x + 1}{(x-1)(x-2)(x-3)}$  as sum of partial fraction.

**Q.5 Answer the following questions. (Any Two)****14**

- a) State and prove Simpson's  $\left(\frac{3}{8}\right)^{\text{th}}$  rule and hence evaluate  $\int_0^1 \frac{dx}{1+x^2}$
- b) State and prove Lagrange's interpolation formula for unequal interval.
- c) Solve :
  - i.  $y_{x+1} y_x + 5y_{x+1} + y_x + 9 = 0$
  - ii.  $y_{x+2} + 6y_{x+1} + 9y_x = x2^x$

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|       |
|-------|
| Set P |
|-------|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper- XIV)**  
**Probability Theory**

Day & Date: Monday, 06-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

**Instructions:** 1) All questions are compulsory and figures to the right indicate full marks.  
 2) Use of scientific calculators and statistical tables is allowed.

**Q.1 Choose the correct alternatives from the options. 14**

- 1) In queuing system, for achieving steady state condition which one of the following is a possible value of traffic intensity?
  - a) -0.5
  - b) 0.5
  - c) 1.5
  - d) 20
- 2) Which of the following statements is/are correct?
  - a) Convergence in probability is stronger than convergence in distribution.
  - b) Convergence in probability is stronger than convergence in quadratic mean.
  - a) Only a)
  - b) Only b)
  - c) Both a) and b)
  - d) Neither a) nor b)
- 3) Time between two successive arrivals is known as \_\_\_\_\_ time.
  - a) Arrival
  - b) Service
  - c) Inter arrival
  - d) Waiting
- 4) Which one of the following expressions is used to know the probability that there is no-one in the system i.e.  $P(0)$ ?
  - a)  $\frac{(\mu - \lambda)}{\mu}$
  - b)  $\frac{\lambda}{\mu}$
  - c)  $\frac{(\lambda)}{(\mu - \lambda)}$
  - d)  $\frac{1}{(\mu - \lambda)}$
- 5) Distribution of \_\_\_\_\_ can be obtained using order statistic.
  - a) Sample range
  - b) Sample median
  - c) Both a) and b)
  - d) Neither a) nor b)
- 6) If  $X_i$  are iid  $N(0, 1)$  r. vs. then, limiting distribution of  $z = \frac{\sum x_i^2 - n}{\sqrt{2n}}$  is  $N(0, 1)$ .
  - a)  $\sqrt{n} \bar{X}$
  - b)  $\frac{\sum x_i^2 - n}{\sqrt{2n}}$
  - c) Both a) and b)
  - d) Neither a) nor b)
- 7) If  $X_n \xrightarrow{D} K_1$  and  $Y_n \xrightarrow{D} K_2$  then, \_\_\_\_\_.
  - a)  $(X_n + Y_n) \xrightarrow{D} (K_1 + K_2)$
  - b)  $(X_n + Y_n) \xrightarrow{P} (K_1 + K_2)$
  - c) Both a) and b)
  - d) Neither a) nor b)
- 8) A state 'i' is said to be transient if \_\_\_\_\_.
  - a)  $P_{ii} = 1$
  - b)  $P_{ii}^{(n)} = 1$
  - c)  $P_{ii}^{(n)} < 1$
  - d) None of these

- 9) In Markov chain state space is \_\_\_\_\_.  
 a) Discrete b) Continuous  
 c) Both a) and b) d) Neither a) nor b)
- 10) Suppose  $X_n$  is the number of students present in the college campus at any time of the day. If  $S$  is state space and  $T$  is parameter space for this process then, \_\_\_\_\_.  
 a)  $S$  and  $T$  are discrete  
 b)  $S$  is discrete and  $T$  is continuous  
 c)  $S$  is continuous and  $T$  is discrete  
 d)  $S$  and  $T$  are continuous
- 11) We say that state 2 communicates with state 4 if \_\_\_\_\_.  
 a)  $P_{24}^{(n)} > 0, P_{42}^{(m)} = 0$  b)  $P_{42}^{(n)} > 0, P_{24}^{(m)} = 0$   
 c)  $P_{24}^{(n)} > 0, P_{42}^{(m)} > 0$  d) None of these
- 12) Convergence in probability of sample mean to population mean is implied by \_\_\_\_\_.  
 a) CLT b) WLLN  
 c) Both a) and b) d) Neither a) nor b)
- 13) If  $P = \begin{bmatrix} 0 & 1 \\ 0.5 & 0.5 \end{bmatrix}$  then two step TPM would be \_\_\_\_\_.  
 a)  $\begin{bmatrix} 0 & 1 \\ 0.5 & 0.5 \end{bmatrix}$  b)  $\begin{bmatrix} 0.25 & 0.75 \\ 0.5 & 0.5 \end{bmatrix}$   
 c)  $\begin{bmatrix} 0.5 & 0.5 \\ 0.25 & 0.75 \end{bmatrix}$  d)  $\begin{bmatrix} 0 & 1 \\ 0.25 & 0.75 \end{bmatrix}$
- 14) For a random sample of size 2 from exp (1) distribution. First order statistic is distributed like \_\_\_\_\_.  
 a) exp(1) b) exp(2)  
 c) exp(n) d) None of these

**Q.2 A) Answer the following questions. (Any Four)****08**

- Fill in the blanks:- If the number of arrivals in interval follow \_\_\_\_\_ distribution then, inter arrival time follows \_\_\_\_\_ distribution.
- Write the expression for average number of customers in the queue when arrival rate is  $\lambda$  and service rate is  $\mu$ .
- Define convergence in probability.
- Define first order statistic and state ( only ) its pdf in usual notations.
- Define transient and recurrent state of a Markov chain.

**B) Answer the following questions. (Any Two)****06**

- If  $X_n \xrightarrow{P} X$  and  $Y_n \xrightarrow{P} Y$  then show that  $(X_n + Y_n) \xrightarrow{P} (X + Y)$  as  $n \rightarrow \infty$ .
- State Weak Law of Large Numbers (WLLN). Also state the conditions for existence of WLLN.
- If the arrival and departure rates in M / M / 1:  $\infty$ /FIFO queuing model are  $\frac{1}{2}$  and  $\frac{2}{3}$  per minute respectively, find average waiting time of a customer in the queue.

**Q.3 A) Answer the following questions. (Any Two)****08**

- State the assumptions made in queuing system on number of arrivals and departures.
- Define Poisson process with parameter  $\lambda$ , stating assumptions involved.

- 3) For the following markov chain with 3 states  $\{0, 1, 2\}$  and initial distribution  $P[X_0 = i] = \frac{1}{3}$  for  $i=0, 1, 2$  and one step

$$\text{TPM } P = \begin{bmatrix} 0.25 & 0.75 & 0 \\ 0.25 & 0.5 & 0.25 \\ 0 & 0.25 & 0.75 \end{bmatrix} \text{ Find } p(X_2 = 1, X_0 = 2).$$

**B) Answer the following questions. (Any One)**

06

- 1) State central limit theorem (CLT) for a sequence of iid r.vs. Prove the same for a sequence of  $B(n, p)$  r. vs.
- 2) i) Prove WLLN for iid r.vs.  
ii) If  $X_1, X_2, \dots, X_n$  is a r.s. from  $\chi^2(10)$  distribution then test whether WLLN holds good for this sequence.

**Q.4 A) Answer the following questions. (Any Two)**

10

- 1) Let  $X_1, X_2, X_3, X_4$  be a random sample of size four from  $U(0,3)$  distribution. Let  $Y_1 < Y_2 < Y_3 < Y_4$  be corresponding order statistic. Find  
i)  $p(Y_1 > M)$  and  
ii)  $P(Y_4 > M)$ , where  $M = \text{Median of } U(0,3) \text{ distribution.}$
- 2) Describe all the parameters of  $M/M/1 : \infty / \text{FIFO}$  queuing model.
- 3) The school of international studies for population had a survey and found that the mobility of the population (in percentages) of a given state to a village, town and city is as below.

|          |         | To      |      |      |
|----------|---------|---------|------|------|
|          |         | Village | City | Town |
| P = From | Village | 50      | 30   | 20   |
|          | City    | 10      | 70   | 20   |
|          | Town    | 10      | 40   | 50   |

What will be the proportion of population in village, city and town after one year given that the present population has proportions of 70, 20, 10 percent in village, town and city.

**B) Answer the following questions. (Any One)**

04

- 1) If  $X_i$  are iid Poisson (0.02) r.vs. for  $i = 1, 2, \dots, 100$  and  $S = \sum X_i$ . Using CLT to evaluate  $p(S \geq 3)$ .
- 2) Customers arrive at a petrol pump in poisson process with an average time of 5 minutes between arrivals. The time intervals between services follow exponential distribution with mean 2 minutes. Find  
i) Is the queue finite?  
ii) Find the probability that the pump is idle  
iii) Find the probability that there are 3 customers in the system.

**Q.5 Answer the following questions. (Any Two)**

14

- a) Let  $\{X_n\}$  be a sequence of iid  $B\left(n, \frac{\lambda}{n}\right)$  r. vs.,  $\lambda > 0$ . Show that  $X_n \xrightarrow{D} x$ , as  $x \rightarrow \infty$  where  $X$  is  $P(\lambda)$  r. v.
- b) For the following one step TPM of a markov chain, obtain stationary distribution.

$$P = \begin{bmatrix} 0 & 1 & 0 & 0 \\ 0.5 & 0 & 0.5 & 0 \\ 0 & 0.5 & 0 & 0.5 \\ 0 & 0 & 1 & 0 \end{bmatrix}$$

- c) Find the distribution of  $Y_r$  when a random sample of size  $n$  is taken from  $\exp(\theta)$  distribution. Hence show that  $Z = Y_{(r+1)} - Y_r$  is exponential r.v. with parameter  $(n - r)\theta$ .

| Set | P |
|-----|---|
| 1   | 1 |
| 2   | 1 |
| 3   | 1 |
| 4   | 1 |
| 5   | 1 |
| 6   | 1 |
| 7   | 1 |
| 8   | 1 |
| 9   | 1 |
| 10  | 1 |
| 11  | 1 |
| 12  | 1 |
| 13  | 1 |
| 14  | 1 |
| 15  | 1 |
| 16  | 1 |
| 17  | 1 |
| 18  | 1 |
| 19  | 1 |
| 20  | 1 |
| 21  | 1 |
| 22  | 1 |
| 23  | 1 |
| 24  | 1 |
| 25  | 1 |
| 26  | 1 |
| 27  | 1 |
| 28  | 1 |
| 29  | 1 |
| 30  | 1 |
| 31  | 1 |
| 32  | 1 |
| 33  | 1 |
| 34  | 1 |
| 35  | 1 |
| 36  | 1 |
| 37  | 1 |
| 38  | 1 |
| 39  | 1 |
| 40  | 1 |
| 41  | 1 |
| 42  | 1 |
| 43  | 1 |
| 44  | 1 |
| 45  | 1 |
| 46  | 1 |
| 47  | 1 |
| 48  | 1 |
| 49  | 1 |
| 50  | 1 |
| 51  | 1 |
| 52  | 1 |
| 53  | 1 |
| 54  | 1 |
| 55  | 1 |
| 56  | 1 |
| 57  | 1 |
| 58  | 1 |
| 59  | 1 |
| 60  | 1 |
| 61  | 1 |
| 62  | 1 |
| 63  | 1 |
| 64  | 1 |
| 65  | 1 |
| 66  | 1 |
| 67  | 1 |
| 68  | 1 |
| 69  | 1 |
| 70  | 1 |
| 71  | 1 |
| 72  | 1 |
| 73  | 1 |
| 74  | 1 |
| 75  | 1 |
| 76  | 1 |
| 77  | 1 |
| 78  | 1 |
| 79  | 1 |
| 80  | 1 |
| 81  | 1 |
| 82  | 1 |
| 83  | 1 |
| 84  | 1 |
| 85  | 1 |
| 86  | 1 |
| 87  | 1 |
| 88  | 1 |
| 89  | 1 |
| 90  | 1 |
| 91  | 1 |
| 92  | 1 |
| 93  | 1 |
| 94  | 1 |
| 95  | 1 |
| 96  | 1 |
| 97  | 1 |
| 98  | 1 |
| 99  | 1 |
| 100 | 1 |

- 11) The precursors for pyrimidine nucleotide synthesis are \_\_\_\_\_.  
 a) aspartate and acetyl CoA  
 b) aspartate and aceto acetic acid  
 c) aspartate and butyryl CoA  
 d) aspartate and carbomoyl – P
- 12) Induced fit hypothesis was proposed by \_\_\_\_\_.  
 a) Emil Fischer  
 b) Koshland  
 c) Monod  
 d) Kuhne
- 13) \_\_\_\_\_ is isoenzyme.  
 a) Aspartate transcarbamoylase  
 b) Aspartate lyase  
 c) Lactate dehydrogenase  
 d) transpeptidase
- 14) Luminescent organisms are generally found in \_\_\_\_\_.  
 a) soil  
 b) air  
 c) fresh water  
 d) marine water

- Q.2 A) Answer the following questions. (Any Four) 08**  
 1) Two examples of Luminescent bacteria.  
 2) Nucleotide.  
 3) Structure of tRNA.  
 4) Stereochemical specificity.  
 5) Ribozyme.
- B) Answer the following questions. (Any Two) 06**  
 1) Extraction of extra cellular enzymes.  
 2) Processing of polypeptide chain.  
 3) Induced fit hypothesis.
- Q.3 A) Answer the following questions. (Any Two) 08**  
 1) Acid – Base catalysis.  
 2) Assimilation of sulfur.  
 3) Pyruvate as key metabolite.
- B) Answer the following questions. (Any One) 06**  
 1) Ion exchange chromatography.  
 2) Biosynthesis of peptidoglycan.
- Q.4 A) Answer the following questions (Any Two) 10**  
 1) Affinity chromatography.  
 2) Initiation of protein synthesis.  
 3) Regulation of allosteric enzyme.
- B) Answer the following questions. (Any One) 04**  
 1) Arabinose operon.  
 2) List uses of immobilized enzymes.
- Q.5 Answer the following questions. (Any Two) 14**  
 a) Methods of immobilization.  
 b) Derive Michaelis-menten equation.  
 c) Assimilation of carbon.



|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

|            |          |
|------------|----------|
| <b>Set</b> | <b>P</b> |
|------------|----------|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov- 2022**  
**ELECTRONICS (Special Paper- XIV)**  
**Embedded System Design**

Day & Date: Monday, 06-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
 2) Draw neat labelled diagram wherever necessary.  
 3) Use of log-table and regular calculator is allowed.

**Q.1 Fill in the blanks by choosing correct alternative given below and write complete sentence. 14**

- 1) The C language was developed by \_\_\_\_\_.  
 a) Patrick Naughton                      b) Dennis Ritchie  
 c) Ken Thompson                         d) Martin Richards
- 2) The memory space reserved for the "long integer" C data type is \_\_\_\_\_ bytes.  
 a) 1                                              b) 2  
 c) 4                                              d) 8
- 3) Which one of these is a looping statement in C?  
 a) if-else                                      b) switch-case  
 c) do-while                                   d) break
- 4) An Embedded System is \_\_\_\_\_.  
 a) Microcontroller-based system      b) dedicated system  
 c) software-driven system               d) all of these
- 5) 89S51 microcontroller has 4K bytes of \_\_\_\_\_ memory.  
 a) UVEPROM                                b) Flash  
 c) NVRAM                                    d) One Time Programmable
- 6) The minimum system using 89S51 does not include \_\_\_\_\_.  
 a) RAM                                        b) ROM  
 c) Clock circuit                             d) LCD
- 7) By default all the ports of uC89S51 are configured as \_\_\_\_\_.  
 a) input port  
 b) output port  
 c) upper nibble as input and lower nibble as output  
 d) upper nibble as output and lower nibble as input
- 8) To configure upper nibble of PORT-1 as input and lower nibble as output, the hex value to be sent to the port is \_\_\_\_\_.  
 a) 0x00                                        b) 0xff  
 c) 0xf0                                        d) 0x0f
- 9) Which of these is an infinite loop statement?  
 a) while(1)                                    b) for(;;)  
 c) for(a=0;a<=20;)                        d) all of these
- 10) The hex data to turn-on alternate LEDs of PORT-1 is \_\_\_\_\_.  
 a) 00 and FF                                b) 55 and AA  
 c) 0A and A0                                d) All of these

- 11)** The resolution or step-size of AD0804 for maximum input of +5V is \_\_\_\_\_.  
a) 1.95 V                                      b) 50 mv  
c) 19.5 mv                                     d) 1 mv
- 12)** The reference current of the DAC is 2-mA for +5V Vcc, the reference resistance value will be \_\_\_\_\_.  
a) 2.5 KΩ                                        b) 5 KΩ  
c) 25 KΩ                                        d) 0.5 KΩ
- 13)** If stepper motor takes 200 steps to complete one revolution, the stepping angle is \_\_\_\_\_.  
a) 7.2°                                          b) 2.5°  
c) 18°                                            d) 1.8°
- 14)** As per ANSI standard, which one of these is not a keyword in C?  
a) While                                        b) When  
c) If                                              d) Do

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Definition of an embedded system. Enlist any two examples.
- 2) Enlist the decision making and loop control statements in C.
- 3) Explain the need of an operating system.
- 4) What is PWM? Briefly explain its use in DC motor speed control.
- 5) Explain the concept of super-loop.

**B) Write notes on. (Any Two)** **06**

- 1) Explain the interfacing of switch and LED.
- 2) Write an embedded-C program to turn-on and turn-off LEDs connected to PORT-1 with one second time-delay.
- 3) Give the applications of embedded system.

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Write an embedded-C program to generate a square-wave on port pin P1.4, without using timers.
- 2) Explain the basic structure of C-program.
- 3) Give the interfacing of an optocoupler and relay to a microcontroller. Write an embedded-C program to turn-on and off the relay through optocoupler.

**B) Answer the following questions. (Any One)** **06**

- 1) Explain the interfacing of DAC0808 to a microcontroller. Write an embedded-C program to generate a triangular wave.
- 2) Explain arrays in C. Write a program to arrange ten numbers in ascending and descending order.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Write an embedded-C program to read PORT-1 data and send it serially at a standard baud rate of 9600 repeatedly in mode-1. Assume a crystal frequency of 11.0592 MHz.
- 2) Explain the basic architecture of an embedded system. Discuss at least three characteristics.
- 3) Explain the data types and data ranges in C.

**B) Answer the following questions. (Any One)****04**

- 1) Draw the interfacing diagram for thumb-wheel switch. Write an embedded-C program to read thumb-wheel switch and send the data to PORT-2.
- 2) Explain the concept of global declaration and local declaration in C, with suitable examples.

**Q.5 Answer the following questions. (Any Two)****14**

- a) Design 89S51 based embedded system for the measurement of temperature or humidity of an environment.
- b) Explain the interfacing of 16X2 LCD. Write an embedded-C program to display "WELCOME".
- c) Explain minimum system using 89S51 for general embedded application. Write an embedded-C program to rotate the stepper motor in clock-wise direction.

\_\_\_\_\_

## Max. Marks: 70

14

- Page 1 of 2

- 11) ORM stands for object Relation Mapping.
  - a) True
  - b) False
- 12) Which of the following is true about SessionFactory object in hibernate?
  - a) The Session Factory is heavy weight object.
  - b) Session Factory object is created during application start up and kept for later use.
  - c) You would need one SessionFactory object per database using a separate configuration file.
  - d) All of the above.
- 13) The struts framework is Used to develop MVC-based web application.
  - a) True
  - b) False
- 14) Which configuration files are used in Struts?
  - a) Application Resources Properties
  - b) struts-config.xml
  - c) All the above
  - d) None of the above

- Q.2 A) Answer the following questions. (Any Four) 08**
- 1) What is Framework?
  - 2) What is ODBC?
  - 3) What is DSN?
  - 4) Define Servlet API.
  - 5) What are the stages of the JSP life cycle?
- B) Write notes on. (Any Two) 06**
- 1) JSTL SQL tags.
  - 2) JDBC drivers.
  - 3) Architecture of Struts.
- Q.3 A) Answer the following questions. (Any Two) 08**
- 1) Explain Generator classes of Hibernate.
  - 2) Explain JSP architecture.
  - 3) Write a JSP page to demonstrate that use of config and application implicit object.
- B) Answer the following questions. (Any One) 06**
- 1) Explain JSP tag elements with example.
  - 2) Write a program to insert employee information in emp table. (use type-I driver)
- Q.4 A) Answer the following questions. (Any Two) 10**
- 1) Explain hibernate annotation in detail.
  - 2) Write a servlet program to implement cookies.
  - 3) Difference Between JDBC and Hibernate Framework.
- B) Answer the following questions. (Any One) 04**
- 1) List out Difference between servlet and CGI.
  - 2) Write a JSP page to display current date time.
- Q.5 Answer the following questions. (Any Two) 14**
- a) Explain steps to create application of Hibernate.
  - b) What is struts? Explain use of Struts and write steps to create application of Struts.
  - c) Explain ReuestDispatcher interface with example.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**Physics (Special Paper – XV)**  
**Atomic, Molecular Physics and Quantum Mechanics**

Day & Date: Tuesday, 07-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Choose the correct alternatives from the options.****14**

- 1) In alkali spectra, the doublet separation decreases with \_\_\_\_\_.  
 a) increase in atomic number  
 b) increase in principal quantum number (n)  
 c) decrease in orbital angular momentum quantum number (l)  
 d) none of these
- 2) In alkali spectra, the selection rule for j in emission transitions is \_\_\_\_\_.  
 a)  $\Delta j = 0$   
 b)  $\Delta j = \pm 1$   
 c)  $\Delta j = 0, \pm 1$   
 d)  $\Delta j = 2$
- 3) The ratio of magnetic moment to the mechanical moment of orbital motion of electron is \_\_\_\_\_.  
 a)  $\frac{e}{2m}$   
 b)  $2\frac{e}{2m}$   
 c)  $2\frac{e}{m}$   
 d)  $\frac{e}{m}$
- 4) If the coupling between  $l^*$  and  $s^*$  is broken in an external magnetic field then we observe \_\_\_\_\_.  
 a) anomalous Zeeman effect  
 b) Paschen back effect  
 c) Stark effect  
 d) Strong field Stark effect
- 5) Electronic Spectra of diatomic molecules occurs in \_\_\_\_\_ region.  
 a) uv-vis  
 b) microwave  
 c) infrared  
 d) X-ray
- 6) Raman shift for Stokes line is \_\_\_\_\_.  
 a) zero  
 b) negative  
 c) positive  
 d) extremum
- 7) Energy of particle which is moving in one-dimensional rigid box is proportional to \_\_\_\_\_.  
 a) square of length of box  
 b) reciprocal of square of length of box  
 c) length of box  
 d) reciprocal of length of box
- 8) Frank-Condon principle, helps in estimating the \_\_\_\_\_.  
 a) intensity of bands  
 b) width of bands  
 c) intermolecular distance  
 d) energy levels

- 9) The zero point energy of linear harmonic oscillator is given by \_\_\_\_\_.  
a)  $E_0 = 0$   
b)  $E_0 = \hbar\omega$   
c)  $E_0 = mc^2$   
d)  $E_0 = \frac{1}{2} \hbar\omega$
- 10) The total energy operator is given by \_\_\_\_\_.  
a)  $\hat{E} = i\hbar \partial/\partial t$   
b)  $\hat{E} = -i\hbar \frac{\partial}{\partial t}$   
c)  $\hat{E} = \frac{-i}{\hbar} \partial/\partial t$   
d)  $\hat{E} = i\hbar \partial^2/\partial t^2$
- 11) The quantity  $\psi\psi^*$  is called \_\_\_\_\_.  
a) Probability density  
b) Probability current density  
c) Reflection co-efficient  
d) Transmission coefficient
- 12) If  $\sin 4x$  is eigen function and  $\frac{d^2}{dx^2}$  is operator then eigen value of operator is \_\_\_\_\_.  
a) -16  
b) +16  
c) -4  
d) 4
- 13) For a free particle the potential energy  $V(r) =$  \_\_\_\_\_.  
a) -1  
b) 0  
c) +1  
d) +2
- 14) Momentum operator is given by \_\_\_\_\_.  
a)  $\frac{\hbar}{i} \frac{d^2}{dx^2}$   
b)  $\frac{\hbar}{i} \frac{d}{dx}$   
c)  $i\hbar \frac{d}{dx}$   
d)  $-i\hbar \frac{d}{dx}$

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Give the electronic configuration of K (potassium)
- 2) What is an operator?
- 3) What are intensity rules?
- 4) Give any four observations of Alkali Spectra
- 5) What are selection rules for alkali spectra?

**B) Write note. (Any Two)** **06**

- 1) Frank Condon principle
- 2) Zero-point energy
- 3) Electronic Spectra of diatomic molecules

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Prove that  $[L^2, L_x] = [L^2, L_y] = [L^2, L_z] = 0$
- 2) Write a note on quantum numbers.
- 3) Obtain the Schrodinger's time independent wave equation for particle.

**B) Answer the following questions. (Any One)** **06**

- 1) Derive Schrodinger's wave equation of a particle in one dimensional rigid box and hence determine energy Eigen value of a particle.
- 2) Give an account of Raman effect.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Write a note on quantum numbers.
- 2) Explain sodium spectrum with neat labelled diagram.
- 3) Give a brief account of stark effect.

**B) Answer the following questions. (Any One)****04**

- 1) Write a note on
  - i) Energy operator
  - ii) momentum operator
- 2) Show that  $[L_x, L_y] = i\hbar L_z$

**Q.5 Answer the following questions. (Any Two)****14**

- a) Explain anomalous Zeeman effect and derive an expression for term shift.
- b) Obtain Eigen value of operator  $L^2$
- c) Obtain an expression for rotational energy of a diatomic molecule and explain its spectrum with energy level diagram.  
In  $CO$ , the  $J = 0 \rightarrow J = 1$  absorption line in rotational spectra occurs at a frequency  $1.153 \times 10^{11} \text{ Hz}$ . Calculate the moment of inertia of molecule and bond length.  
Given: Mass of  $^{12}\text{C} = 1.99 \times 10^{-26} \text{ kg}$   
Mass of  $^{16}\text{O} = 2.66 \times 10^{-26} \text{ kg}$



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**CHEMISTRY (Special Paper- XV)**  
**Organic Chemistry**

Day & Date: Tuesday, 07-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

- 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 Choose the most correct alternative of the following.****14**

- 1) \_\_\_\_\_ is used as a synergist to increase the insecticidal potency of pyrethrum.
  - a) piperonylpentoxide
  - b) piperonylbutoxide
  - c) piperonylmethoxide
  - d) all of these
- 2) Pyridine on heating with sodamide gives \_\_\_\_\_.
  - a) 2-amino pyridine
  - b) 3-amino pyridine
  - c) 4-amino pyridine
  - d) no reaction
- 3) Vat dyes are water \_\_\_\_\_ dyes.
  - a) Soluble
  - b) insoluble
  - c) partly soluble
  - d) dispersed
- 4) N-methyl amide of aceto acetic acid is used in the synthesis of \_\_\_\_\_.
  - a) Carbaryl
  - b) IAA
  - c) Baygon
  - d) monocrotophos
- 5) \_\_\_\_\_ is used for latex production in rubber tree.
  - a) Ethophan
  - b) Sevin
  - c) Carbaryl
  - d) all of these
- 6) Heterocyclic compounds containing nitrogen are named by using prefix \_\_\_\_\_.
  - a) oxa
  - b) aza
  - c) phospho
  - d) thia
- 7) \_\_\_\_\_ is a natural dye.
  - a) Methyl red
  - b) Picric acid
  - c) Thioindigo
  - d) Indigo
- 8) Chemically Adrenaline is a derivative of \_\_\_\_\_.
  - a) resorcinol
  - b) amino acid
  - c) naphthol
  - d) catechol
- 9) D-arabinose is a \_\_\_\_\_ type of sugar.
  - a) aldohexose
  - b) aldopentose
  - c) ketopentose
  - d) ketohexose
- 10) Drugs used to lower body temperature are called as \_\_\_\_\_.
  - a) Anti-inflammatory
  - b) analgesics
  - c) antipyretics
  - d) anesthetics

- 11) Lactose is on hydrolysis gives a mixture of \_\_\_\_\_.  
 a) glucose + fructose                      b) glucose + glucose  
 c) galactose + glucose                    d) glucose + gulose
- 12) Vitamin \_\_\_\_\_ is soluble in water.  
 a) C                                              b) D  
 c) A                                              d) K
- 13) Chloromycetin is a \_\_\_\_\_ rotatorybroad spectrum antibiotic.  
 a) dextro                                      b) laevo  
 c) meso                                        d) none of these
- 14) \_\_\_\_\_ is the precursor of vitamin-A.  
 a) Isoprene                                    b) Thiophene  
 c) Ecosprene                                d) (beta)  $\beta$ -Carotene

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Define mutarotation.
- 2) What is meant by chromophore and auxochrome?
- 3) Draw the structure of penicillin.
- 4) What are drugs? Mention qualities of an ideal drug.
- 5) Draw the structure of thyroxine.

**B) Write note. (Any Two) 06**

- 1) Synthesis and uses of phenolphthalein.
- 2) The structure and uses of sucrose.
- 3) CNS drugs.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Write a note on Killiani Fischer synthesis.
- 2) Explain basic character of Pyrrole and Pyridine.
- 3) What are the limitations of open chain structure of D-glucose?

**B) Answer the following questions. (Any One) 06**

- 1) Write sources, structures and uses of starch and cellulose.
- 2) Match the following pairs.

| Group A             | Group B              |
|---------------------|----------------------|
| i) Palludrin        | a) Antidiabetic      |
| ii) Ethambutol      | b) Antibiotic        |
| iii) Phenobarbitone | c) Anticancer        |
| iv) Tolbutamide     | d) Antimalarial      |
| v) Chlorambucil     | e) Antitubercular    |
| vi) Penicillin-G    | f) CNS               |
|                     | g) Anti-inflammatory |

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) What are hormones? Write synthesis of Adrenaline.
- 2) Mention different types of water soluble dyes with example.
- 3) Write mechanism of Skraup's synthesis of Quinoline.

**B) Answer the following questions. (Any One) 04**

- 1) Write synthesis and uses of ibuprofen.
- 2) Give synthesis and uses of methoxychlor.

**Q.5 Answer the following questions. (Any Two)**

- a) Explain in detail analytical evidences put forth in support of structure of Vitamin-A.
- b) Discuss methylation method used to determine ring size of D-glucose.
- c) What is the action of following on pyrrole?
- |                                                           |                                                       |
|-----------------------------------------------------------|-------------------------------------------------------|
| i) $\text{HNO}_3/\text{Ac}_2\text{O}$ , $0^\circ\text{C}$ | ii) $\text{SO}_3/\text{Pyridine}$ $100^\circ\text{C}$ |
| iii) $\text{I}_2/\text{KI}$                               | iv) $\text{C}_6\text{H}_5\text{N}_2^+\text{Cl}^-$     |
| v) $(\text{CH}_3\text{CO})_2\text{O}$ , $\text{SnCl}_4$   | vi) $\text{Ni}/\text{H}_2$ . $200^\circ\text{C}$      |
| vii) $\text{CrO}_3/\text{CH}_3\text{COOH}$                |                                                       |

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper - XV)**  
**Plant Metabolism**

Day & Date: Tuesday, 07-02-2023  
 Time: 03:00 PM To 5:30 PM

Max. Marks: 70

**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 Fill in the blanks by choosing the correct alternatives given below. 14**

- 1) The main function of \_\_\_\_\_ is to store energy within the cell.
  - a) AMP
  - b) ABP
  - c) ADP
  - d) ATP
- 2) The PPP is also known as \_\_\_\_\_ pathway.
  - a) Warburg-Christian
  - b) Christian-Warburg
  - c) Warburg-Dickens
  - d) Dickens –Christian
- 3) The condensation of two monosaccharide yields \_\_\_\_\_.
  - a) disaccharides
  - b) polysaccharides
  - c) large amino acid chains
  - d) large  $\beta$  sheets
- 4) Stearic acid contains \_\_\_\_\_ carbon atoms.
  - a) 14
  - b) 16
  - c) 18
  - d) 20
- 5) The conformational model of ATP synthase was proposed by \_\_\_\_\_.
  - a) Walkar
  - b) Boyer
  - c) Skou
  - d) Walkar & Skou
- 6) The cyanide resistant respiration in plants is possible due to special type of enzyme \_\_\_\_\_.
  - a) Aldose
  - b) Enolase
  - c) Alternative oxidase
  - d) Isomerase
- 7) \_\_\_\_\_ is a disaccharide of Glucose and galactose sugar units.
  - a) Fructose
  - b) Lactose
  - c) Sucrose
  - d) Ribose
- 8) \_\_\_\_\_ are the simple lipids.
  - a) Waxes
  - b) Phospholipids
  - c) Glycolipids
  - d) as sulfolipids
- 9) In polysaccharides, monosaccharides are joined by \_\_\_\_\_.
  - a) Peptide bond
  - b) glucose bond
  - c) glycosidic bond
  - d) covalent bond
- 10) The ATP molecule is formed by combination of \_\_\_\_\_.
  - a) Adenine, sucrose and phosphate
  - b) Adenine, ribose and phosphate
  - c) Cytosine, ribose and phosphate
  - d) Adenine, glucose and phosphate

- 11) The Glycolysis occurs in \_\_\_\_\_.
  - a) cytosol
  - b) mitochondria
  - c) chloroplast
  - d) peroxisomes
- 12) The \_\_\_\_\_ is a saturated fatty acid.
  - a) palmitic acid
  - b) linoleic acid
  - c) linolenic acid
  - d)  $\alpha$  linolenic acid
- 13) The \_\_\_\_\_ is very sensitive to inhibitors like cyanide.
  - a) Cytochrome 'C' oxidase
  - b) catalase
  - c) peroxidase
  - d) dehydrogenase
- 14) The word ATP stands for \_\_\_\_\_.
  - a) Adenosine monophosphate
  - b) Adenosine biphosphate
  - c) Adenosine diphosphate
  - d) Adenosine triphosphate

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Define photophosphorylation.
- 2) Define carbohydrates.
- 3) Give the outline of lipid classification.
- 4) Define glycolysis.
- 5) Define Isomers.

**B) Answer the following questions. (Any Two)** **06**

- 1) Explain the structure of ATP molecule.
- 2) Give the properties of monosaccharides.
- 3) Explain Racker's experiment.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Explain conversion of pyruvate to acetyl Co. A.
- 2) Give the properties of saturated fatty acids.
- 3) Explain the cyanide resistant respiration.

**B) Answer the following questions. (Any Two) 06**

- 1) Give the properties of oligosaccharides.
- 2) Explain epimers in carbohydrates.
- 3) Explain oxidative phosphorylation.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Explain in brief classification of carbohydrates.
- 2) Describe electron transport system in mitochondria.
- 3) Explain Glycolysis.

**B) Answer the following questions. (Any One)** **04**

- 1) Write a note on linoleic acid.
- 2) Explain biosynthesis and degradation of starch.

**Q.5 Answer the following questions. (Any Two)** **14**

- Explain ATP synthase and add a note on Boyer's conformational model.
- Describe TCA cycle.
- Explain biosynthesis and degradation of sugar.

**Seat  
No.**

Day & Date: Tuesday, 07-02-2023  
Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

## 14

- 1) Transcriptionally active areas of chromosomes are called \_\_\_\_\_.  
a) Euchromatin                      b) Heterochromatics  
c) Telomere                          d) Allochromosome
- 2) DNA synthesis occurs in \_\_\_\_\_ phase of cell.  
a) M                                      b) S  
c) G<sub>0</sub>                                    d) G<sub>1</sub>
- 3) In eukaryotes transcription is initiated by \_\_\_\_\_.  
a) RNA polymerase I                b) RNA polymerase II  
c) RNA polymerase III              d) RNA polymerase IV
- 4) The enzyme which cleaves DNA at 5' of 3' end is called as \_\_\_\_\_.  
a) Exonuclease                        b) Nuclease  
c) Endonuclease                      d) Pronuclease
- 5) Restriction endonuclease enzymes are also called as \_\_\_\_\_.  
a) Transporter                         b) Isomerase  
c) Permease                            d) Molecular scissor
- 6) RNA polymerase III transcribes \_\_\_\_\_.  
a) Small nuclear RNAs & tRNAs    b) tRNA  
c) mRNA                                d) rRNA
- 7) Prokaryotic RNA polymerase has \_\_\_\_\_ subunits.  
a) Four                                    b) Six  
c) Three                                  d) Five
- 8) DNA replication is discontinuous for strand synthesized in overall \_\_\_\_\_ direction.  
a) 5' → 3'                                b) 3' → 5'  
c) Both direction                        d) All directions
- 9) First direct evidence showing that genetic material is DNA is \_\_\_\_\_.  
a) Griffith's Transformation            b) Hershey Chase experiment  
c) Watson & Crick Experiments      d) Avery McDade, Nc. Carty
- 10) The mechanism of DNA replication is \_\_\_\_\_.  
a) Conservative                         b) Semi conservative  
c) Dispersive                              d) Duplicate
- 11) Coding regions are known as \_\_\_\_\_.  
a) Jumping genes                        b) Exons  
c) Introns                                 d) Pseudogenes

- 12) 146 nucleotide long segment of DNA resistant to nuclease is called \_\_\_\_\_.  
a) Base pair  
b) Nucleoside  
c) Nucleosome  
d) Nucleoid
- 13) \_\_\_\_\_ vectors replicate in both E.coli and Eukaryotes.  
a) YE plasmid  
b) YR plasmid  
c) YI plasmid  
d) Shuttle vectors
- 14) Terminator sequences in prokaryotic mRNA's are \_\_\_\_\_.  
a) 5'UUUUUU3'  
b) 5'GUGGG3'  
c) 5'CCCC3'  
d) 5'AAAAAA3'

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) DNA ligase.
- 2) Amino acid.
- 3) tRNA.
- 4) Cosmid
- 5) Insulin.

**B) Write note. (Any Two)** **06**

- 1) Nobble hypothesis
- 2) Restriction enzymes
- 3) Photo reactivation

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Nucleosome concepts.
- 2) Griffith's transformation experiment.
- 3) Cloning technique and applications

**B) Answer the following questions. (Any One)** **06**

- 1) Golden rice and its application.
- 2) Excision repair mechanism.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Applications of biotechnology in agriculture.
- 2) Avery, McDade and Mc Carty experiments.
- 3) Cloning vectors.

**B) Answer the following questions. (Any One)** **04**

- 1) Properties of genetic code.
- 2) Post transcriptional modifications in Eukaryotic mRNA.

**Q.5 Answer the following questions. (Any Two)** **14**

- Describe steps in rDNA technology.
- Explain protein synthesis in Prokaryotes.
- Describe DNA synthesis i.e. replication in eukaryotes.





- 12) Which is correct for loop statement?
- For (initialization: test - condition ; increment)
  - For (initialization ; condition, increment)
  - For (increment : test condition : initialization)
  - For (increment: initialization : test condition)
- 13) In a C, Vector is a \_\_\_\_\_.  
 a) One dimensional array                      b) Two dimensional array  
 c) Multi dimensional array                  d) Mixed array
- 14) By default the C function returns \_\_\_\_\_ value.  
 a) Character                                      b) Float  
 c) Double                                         d) Integer

**Q.2 A) Attempt any four** **08**

- What does int main (void) mean?
- Write names of mathematical function used in c.
- Write any four reserved keywords.
- Write logical operator in c.
- Write syntax of formatted input & formatted output

**B) Attempt any Two.** **06**

- Explain one dimensional array.
- Explain simple if statement.
- Explain do-while statement.

**Q.3 A) Attempt any Two.** **08**

- Explain if --- else statement.
- Write a programme to accept height and base of triangle and calculate area of triangle.
- Explain two dimensional array.

**B) Attempt any one.** **06**

- Write note on increment operator and decrement operator.
- Explain reading a character and writing a character.

**Q.4 A) Attempt any two.** **10**

- Explain in detail C-data types.
- Explain Bitwise operator and special operator
- Write a C-programme to find maximum number between given three number.

**B) Attempt any one.** **04**

- Explain switch statement.
- Explain for statement.

**Q.5 Attempt any two.** **14**

- Explain if.... else, Nested if.... else and else if ladder statement.
- Describe Basic structure of C-program.
- Write a C program to find the solution of the equation  
 $ax^2 + bx + c = 0 ; a \neq 0.$

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper- XV)**  
**Designs of Experiments**

Day & Date: Tuesday, 07-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Choose the correct alternative from the following.** **14**

- 1) The expected value of error component in a design of experiment is assumed to be
 

|      |           |
|------|-----------|
| a) 1 | b) 2      |
| c) 0 | d) 0 or 1 |
- 2) In RBD with error degrees of freedom 12, with 4 blocks, the required number of treatment would be
 

|      |      |
|------|------|
| a) 5 | b) 4 |
| c) 6 | d) 3 |
- 3) In CRD with 5 treatments, degrees of freedom for treatment S.S is
 

|      |      |
|------|------|
| a) 3 | b) 4 |
| c) 5 | d) 6 |
- 4) The principle of local control is not used in
 

|                |        |
|----------------|--------|
| a) RBD         | b) CRD |
| c) CRD and LSD | d) LSD |
- 5) The total number of interaction effects in a  $2^2$  factorial experiment is
 

|      |      |
|------|------|
| a) 3 | b) 4 |
| c) 1 | d) 2 |
- 6) In case of LSD with m treatments, the degrees of freedom for error is:
 

|                 |            |
|-----------------|------------|
| a) m-1          | b) $m^2$   |
| c) $(m-1)(m-2)$ | d) $m^2-1$ |
- 7) In a RBD, which of the following is an unbiased estimator of error variance?
 

|                                  |
|----------------------------------|
| a) Treatment sum of squares      |
| b) Treatment mean sum of squares |
| c) Error sum of squares          |
| d) Error mean sum of squares     |
- 8) Randomized block design is a
 

|                               |                             |
|-------------------------------|-----------------------------|
| a) One restrictional design   | b) Two restrictional design |
| c) Three restrictional design | d) None of these            |
- 9) Local control helps to
 

|                                    |
|------------------------------------|
| a) reduce the number of treatments |
| b) increase the number of plots    |
| c) reduce the error variance       |
| d) increase the error d.f.         |

- 10) The main purpose of confounding in a factorial experiment is to reduce the size of
- Blocks
  - replicates
  - treatments
  - experimental units
- 11) Randomization is a process in which the treatments are allocated to the experimental units:
- In a sequence
  - with equal probability
  - At the will of the investigator
  - None of these
- 12) In the replicate given below:
- |         |   |    |    |     |
|---------|---|----|----|-----|
| Block 1 | b | ac | be | (1) |
| Block 2 | a | b  | c  | abc |
- Confounded effect is
- AB
  - AC
  - BC
  - ABC
- 13) The factors like date of sowing and breeds are often used as
- experimental unit
  - treatments
  - replicates
  - None of these
- 14) A factorial experiment with three factors each at two levels is called.
- 2x3 factorial experiment
  - 3x2 factorial experiment
  - 3<sup>2</sup> factorial experiment
  - 2<sup>3</sup> factorial experiment

**Q.2 A) Attempt any four of the following: 08**

- Define efficiency of design.
- Explain partial confounding.
- State the formula for efficiency of LSD over RBD, when rows are taken as blocks.
- Give two merits of CRD.
- State the formula to estimate one missing value in LSD.

**B) Attempt any two of the following 06**

- Explain Layout of an experiment.
- Explain the missing plot technique.
- Define Block and critical difference (C.D.)

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

- Describe the ANOVA technique for one-way classification.
- What is Randomized block design? Give its layout.
- Give the mathematical model, assumptions and analysis of variance table in case of LSD.

**B) Attempt any one of the following: 06**

- Following data are available for 5x5 LSD  
Row S.S.= 22, Column S.S.= 26,  
Treatment S.S.= 16, Error S.S.= 18.  
Prepare ANOVA table and test equality of treatment effects.  
(Given,  $F_{(4,12)}; 0.05 = 3.26$ )
- Obtain the formula for estimating one missing observation in LSD.

**Q.4 A) Attempt any two of the following: 10**

- Derive the equations to estimate two missing values in RBD.
- Explain Yate's procedure to obtain factorial effect totals in a 2<sup>3</sup> factorial experiment.
- Describe the basic principles randomization and local control in a design of experiment.

**B) Attempt any one of the following.****04**

- 1) Obtain the efficiency of RBD over CRD.
- 2) Compute relative efficiency of LSD over CRD with the following information:  
Treatment. S.S. = 98.4  
Row S.S. = 121.3  
Column S.S. = 103.1  
Error S.S. = 111.8  
Degrees of freedom for total S.S. = 24.

**Q.5 Attempt any two of the following.****14**

- a) State mathematical model, assumptions and ANOVA table in CRD
- b) What is meant by the main effect and interaction effect in a  $2^2$  factorial experiment? Derive the expression for main and interaction effect.
- c) What is 'ANOCOVA'? Explain in brief the technique of analysis of covariance in CRD.



- 12) Indian gondawana basins are commonly found in \_\_\_\_ type of structures.
  - a) Horst
  - b) Graben
  - c) Anticline
  - d) Syncline
- 13) Beginning of Deccan volcanic province is found in \_\_\_\_ era.
  - a) Mesozoic
  - b) Paleozoic
  - c) Cenozoic
  - d) Proterozoic
- 14) Inter-trappean beds are found in \_\_\_\_\_.
  - a) Himalaya
  - b) Dharwar
  - c) Cuddapah
  - d) DVP

- Q.2 A) Answer the following. (Any Four) 08**
- 1) What is the geological age of Deccan Volcanic Province?
  - 2) On which formation of gondwana glacial depositional environment is derived?
  - 3) Correct the following sequence 'Katrol, pancham, Chari, umia'?
  - 4) Write a note on fenestella shales?
  - 5) What is the geological age of Muth Quartzite?
- B) Answer the following. (Any Two) 06**
- 1) What is the depositional environment of Pranhita-Godavari valley?
  - 2) Write a short note on Rajmahal basin?
  - 3) Write a brief note on Lonar lake?
- Q.3 A) Answer the following. (Any Two) 08**
- 1) Write a brief note on Surma-Tipam succession in Assam?
  - 2) Write a note on Kioto limestone?
  - 3) Write a short note on tectonic characteristics of gondwana?
- B) Answer the following. (Any One) 06**
- 1) Describe in detail haimanta series?
  - 2) Describe in detail depositional environment of gondwana formation?
- Q.4 A) Answer the following. (Any Two) 10**
- 1) Write a note on Inter-trappean beds?
  - 2) Write a brief note on west coast alluvium deposits?
  - 3) List out the paleozoic formation in spiti with its lithology and fossils?
- B) Answer the following. (Any One) 04**
- 1) Write a note on Lipak and Po series?
  - 2) Explain lameta beds?
- Q.5 Answer the following. (Any Two) 14**
- a) Explain phanerozoic stratigraphy of Maharashtra?
  - b) Describe litho and biostratigraphy of Jurassic of Kutch?
  - c) Describe in brief, stratigraphy of Pranhita-Godavari valley with its economic importance?

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Special Paper- XV)**  
**Environmental Microbiology**

Day & Date: Tuesday, 07-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

**Instructions:** 1) All questions are compulsory & carry equal Marks.  
 2) Draw a neat labeled diagram wherever necessary.  
 3) Figure to the right indicates full marks.

**Q.1 Rewrite the sentences by selecting correct answer from given alternatives. 14**

- 1) The ozone is present in \_\_\_\_\_ layer of atmosphere.
  - a) Exosphere
  - b) Troposphere
  - c) Stratosphere
  - d) Mesosphere
- 2) Barophiles are the organisms which require \_\_\_\_\_ for its growth.
  - a) Highly alkaline condition
  - b) Higher temperature
  - c) High salt concentration
  - d) High hydrostatic pressure
- 3) \_\_\_\_\_ gas has the highest affinity for blood hemoglobin.
  - a) Carbon dioxide
  - b) CO
  - c) PAN
  - d) Nitrogen
- 4) \_\_\_\_\_ is the main cause of Eutrophication.
  - a) Animal population
  - b) Algal mass
  - c) Pollutants
  - d) Reduction in DO
- 5) If BOD of a river is high, it means that the river \_\_\_\_\_.
  - a) Is very polluted
  - b) Is not polluted
  - c) Gets least amount of light
  - d) Does not have green plants
- 6) \_\_\_\_\_ is a liquid form of aerosol.
  - a) Fume
  - b) Dust
  - c) Mist
  - d) Smoke
- 7) A lake with low primary productivity, as a result of low nutrient content is known as \_\_\_\_\_.
  - a) Eutrophic lake
  - b) Oligotrophic lake
  - c) Mesotrophic lake
  - d) Hypereutrophic lake
- 8) Bioremediation carried out by plants to degrade pollutants is called as \_\_\_\_\_.
  - a) Biopile
  - b) Land farming
  - c) Composting
  - d) Phytoremediation
- 9) Dyes are common in the waste generated from \_\_\_\_\_ industry.
  - a) Textile
  - b) Dairy
  - c) Distillery
  - d) Sugar

- 10) \_\_\_\_\_ is non-biodegradable.  
 a) Fertilizers                      b) Crop waste  
 c) Radioactive substance        d) Agrochemicals
- 11) \_\_\_\_\_ play an important role in leaching of uranium.  
 a) *Escherichia coli*  
 b) *Thiobacillus ferrooxidans*  
 c) *Bacillus Polymyxa*  
 d) *Strepto verticillium spp*
- 12) Halophillic bacteria grow best at salt concentration of \_\_\_\_\_ %.  
 a) 2.5 to 4                              b) 0.5 to 2  
 c) 4 to 5                                d) 0.1 to 1
- 13) Incubation time for BOD test is \_\_\_\_\_ days.  
 a) 5                                        b) 7  
 c) 10                                      d) 20
- 14) Study of animals in germ free environment is known as \_\_\_\_\_.  
 a) Geology                              b) Gnotobiology  
 c) Geomicrobiology                d) Xenobiology

**Q.2 A) Write answers of the following question. (Any Four) 08**

- 1) What is bioremediation?
- 2) Explain Bioaerosol.
- 3) Enlist the Germ free animals.
- 4) Define Pollution.
- 5) What are Osmophiles?

**B) Answer the following. (Any Two) 06**

- 1) Characteristics of textile industry waste water.
- 2) Mechanism of adaptations of halophiles.
- 3) Explain CO<sub>2</sub> as air pollutant.

**Q.3 A) Attempt any Two of the following. 08**

- 1) Explain in brief biological oxygen demand (BOD) of water.
- 2) What are Extremophiles? What are the applications of extremozymes?
- 3) Explain bioleaching of uranium.

**B) Attempt any One of the following. 06**

- 1) Explain causes, effects and control measures of Eutrophication.
- 2) Write an essay on types of waste and Waste water assessment and management.

**Q.4 A) Attempt any Two of the following. 10**

- 1) Write an essay of biological safety.
- 2) What is microbial leaching? Explain it with respect to copper.
- 3) Give characteristics of wastes generated from Sugar and Distillery industry.

**B) Attempt any One of the following. 04**

- 1) Explain characteristics and treatment of waste generated from Paper and Pulp Industry.
- 2) What are the various sampling methods for airborne microorganisms?

**Q.5 Attempt any Two of the following. 14**

- a) Explain causes, impact and control of depletion of ozone layers.
- b) Explain in detail characteristics and treatment of dairy waste.
- c) Describe in detail microbial-enhanced oil recovery.



|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

|            |          |
|------------|----------|
| <b>Set</b> | <b>P</b> |
|------------|----------|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**ELECTRONICS (Special Paper- XV)**  
**Electronics Instrumentation**

Day & Date: Tuesday, 07-02-2023  
Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Fill in the blanks by choosing correct alternatives given below. 14**

- 1) In case of multichannel DAS, the \_\_\_\_\_ device is of importance.  
a) signal conditioner                      b) multiplexer  
c) input                                        d) output
- 2) The \_\_\_\_\_ technique are used to eliminate noise or interference from the signal.  
a) grounding  
b) electrostatic shielding  
c) electromagnetic shielding  
d) all of the above
- 3) The frequency generator utilizes \_\_\_\_\_ to produce the frequency  
a) integrator                                b) differentiator  
c) both a & b                                d) amplifier
- 4) The 4-20 mA current transmission is an example of \_\_\_\_\_ technique.  
a) ratiometric conversion  
b) offset compensation  
c) logarithmic conversion  
d) grounding
- 5) The X-Y recorder is a \_\_\_\_\_ type recorder.  
a) magnetic                                b) graphic  
c) strip chart                                d) digital
- 6) The AD 494/495 is pre calibrated precision amplifier to produce output voltage \_\_\_\_\_ from thermocouple signal.  
a) 1 m V/°C                                b) 10 m V/°C  
c) 1 micro V/°C                                d) 10 micro V/°C
- 7) The \_\_\_\_\_ device handles the data in digital form.  
a) data logger                                b) frequency generator  
c) CRO                                        d) digital multimeter
- 8) The standard glass pH electrode is \_\_\_\_\_ electrode.  
a) Amperometric                                b) potentiometric  
c) variable capacitance                                d) variable resistance
- 9) The programmable instrumentation amplifier has \_\_\_\_\_.  
a) Low offset voltage                                b) Low offset voltage drift  
c) low noise                                d) all of these

- 10) To remove low frequency noise from the circuit \_\_\_\_\_ is used.
  - a) filter
  - b) chopper
  - c) pre-amplifier
  - d) multiplexer
- 11) The essential component in digital storage oscilloscope is \_\_\_\_\_ circuit
  - a) pre-amplifier
  - b) sample and hold
  - c) oscillator
  - d) filter
- 12) To measure unknown resistance the digital multi-meter uses \_\_\_\_\_ source.
  - a) constant voltage
  - b) variable voltage
  - c) variable current
  - d) constant current
- 13) Typical gain range of AD 620 Instrumentation amplifier is \_\_\_\_\_.
  - a) 1 – 10
  - b) 1 – 100
  - c) 1 – 1000
  - d) 1 – 10,000
- 14) Oscilloscope is \_\_\_\_\_.
  - a) a ohmmeter
  - b) an ammeter
  - c) a voltmeter
  - d) a multimeter

- Q.2 A) Write answers of the following question. (Any Four) 08**
- 1) State the salient features of AD 620.
  - 2) Draw block diagram of CRO.
  - 3) Give features of data loggers.
  - 4) Draw pin diagram of AD 594.
  - 5) Explain need of DAS.
- B) Write notes on (Any Two) 06**
- 1) Single channel DAS
  - 2) Magnetic Recorder
  - 3) Grounding techniques
- Q.3 A) Attempt any Two of the following. 08**
- 1) Describe computer based DAS.
  - 2) Explain ratiometric and logarithmic conversion.
  - 3) Explain 4-20 mA current transmission.
- B) Attempt any One of the following. 06**
- 1) Explain DC & AC signal conditioning system.
  - 2) Describe function generator with suitable block diagram.
- Q.4 A) Attempt any Two of the following. 10**
- 1) Describe pH meter.
  - 2) Explain bridge amplifier for signal conditioning.
  - 3) Explain multichannel DAS with the help of block diagram.
- B) Attempt any One of the following. 04**
- 1) Explain digital Multimeter.
  - 2) Explain LCR Q meter using block diagram.
- Q.5 Attempt any Two of the following. 14**
- 1) Explain digital oscilloscope with the help of block diagram.
  - 2) Give the principle, block diagram and working of a temperature meter.
  - 3) Explain basic operation of data loggers with suitable block diagram.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Tuesday, 07-02-2023  
Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

## 14

- 1) TCP groups a number of bytes together into a packet called \_\_\_\_\_.  
a) Packet                                  b) Buffer  
c) Segment                                d) Stack
- 2) \_\_\_\_\_ layer is an addition to OSI model when compared with TCP/ IP model.  
a) Application layer  
b) Presentation layer  
c) Session layer  
d) Both Session and Presentation layer
- 3) The physical layer translates logical communication requests from the \_\_\_\_\_ into hardware specific operations.  
a) data link layer                      b) network layer  
c) transport layer                     d) application layer
- 4) CRC stands for \_\_\_\_\_.  
a) cyclic redundancy check  
b) code repeat check  
c) code redundancy check  
d) cyclic repeat check
- 5) FTP is built on \_\_\_\_\_ architecture.  
a) Client-server                        b) Point to Point  
c) Data centric                         d) Service oriented
- 6) A subset of a network that includes all the routers but contains no loops is called.  
a) spanning tree                        b) spider structure  
c) spider tree                            d) none of the mentioned
- 7) The underlying Transport layer protocol used by SMTP is \_\_\_\_\_.  
a) TCP                                      b) UDP  
c) Either TCP or UDP                d) IMAP
- 8) Wildcard domain names start with label \_\_\_\_\_.  
a) @                                        b) \*  
c) &                                         d) #
- 9) Transport layer protocols deals with.  
a) application to application communication  
b) process to process communication  
c) node to node communication  
d) none of the mentioned

- 10) The sharing of a medium and its link by two or more devices is called \_\_\_\_\_.  
a) Fully duplexing  
b) Multiplexing  
c) Both Fully duplexing and Multiplexing  
d) Duplexing
- 11) Radio channels are attractive medium because \_\_\_\_\_.  
a) Can penetrate walls  
b) Connectivity can be given to mobile user  
c) Can carry signals for long distance  
d) All of the mentioned
- 12) What is a web browser?  
a) a program that can display a web page  
b) a program used to view html documents  
c) it enables user to access the resources of internet  
d) all of the mentioned
- 13) The HTTP request message is sent in \_\_\_\_\_ part of three-way handshake.  
a) First  
b) Second  
c) Third  
d) Fourth
- 14) What are the Methods to move data through a network of links and switches?  
a) Packet switching  
b) Circuit switching  
c) Line switching  
d) Both Packet switching and Circuit switching

- Q.2 A) Write answers of the following questions. (Any Four) 08**  
1) What is hamming distance?  
2) Define any four applications of network.  
3) Explain Manchester coding.  
4) Which are the two types of bridge?  
5) Why protocols needed?
- B) Write notes on (any two) 06**  
1) Period, amplitude  
2) Framing  
3) Data compression
- Q.3 A) Attempt any Two of the following questions. 08**  
1) Briefly explain design issues for layers.  
2) Define multiplexing. Explain frequency division multiplexing.  
3) Discuss optimality principal with one example.
- B) Attempt any One of the following questions. 06**  
1) What is mean by modulation? Explain Amplitude Modulation, Frequency Modulation.  
2) Explain WWW in detail.
- Q.4 A) Attempt any Two of the following questions. 10**  
1) What is mean by guided media? Explain its types.  
2) How CSMA/CD works.  
3) What is mean by congestion? Explain its prevention policies.

**B) Attempt any One of the following questions. 04**

- 1) What is mean by transmission imperilment? Explain its types.
- 2) What is DNS?

**Q.5 Attempt any Two of the following. 14**

- a) What is Channelization? Explain the FDMA and CDMA in detail.
- b) Explain ISO-OSI model in detail.
- c) Explain working of SMTP in detail.

**Seat  
No.**

## Max. Marks: 70

14

- Page 1 of 2

- 12) A MOSFET uses electric field of a \_\_\_\_\_ to control the channel current.  
a) capacitor  
b) battery  
c) generator  
d) both battery and generator
- 13) An n-channel D-MOSFET with positive  $V_{GS}$  is operating in \_\_\_\_\_.  
a) the depletion mode  
b) the enhancement mode  
c) cut off  
d) saturation
- 14) The slew rate of OP-AMP is measured in \_\_\_\_\_.  
a)  $\mu\text{sec}/\text{v}$   
b)  $\text{v}/\mu\text{sec}$   
c)  $\mu\text{ V}/\text{sec}$   
d)  $\text{sec}/\mu\text{V}$

**Q.2 A) Answer the following questions. (Any Four)** **08**

- 1) What is an operational amplifier?
- 2) Define duty cycle in astable multivibrator.
- 3) Draw equivalent circuit of SCR.
- 4) Define the terms breakover voltage and holding current.
- 5) What is triac?

**B) Write short notes. (Any Two)** **06**

- 1) What are advantages of LEDs?
- 2) Give comparison between D-MOSFET and E-MOSFET
- 3) What are characteristics of LCD?

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Explain circuit operation of E-MOSFET.
- 2) Explain operational amplifier as Schmitt trigger.
- 3) Give the application of SCR to control the speed of DC motor.

**B) Answer the following questions. (Any One) 06**

- 1) Explain construction and working of diac.
- 2) An operational amplifier is used in non-inverting mode with  $R_1 = 1\text{ K}\Omega$ ,  $R_2 = 12\text{ K}\Omega$ ,  $V_{cc} = \pm 15$ . Calculate output voltage for.
  - i)  $V_i = 250\text{mV}$
  - ii)  $V_i = 3\text{V}$
  - iii)  $V_i = 500\text{mV}$

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) An astable mode of IC 555 is designed to a rectangular waveform with  $T_{ON} = 0.6$  ms. Draw the circuit diagram with various component values. Also calculate the frequency of oscillations and duty cycle. Assume total period (T) to be 1 ms. (Given:  $C = 0.1 \mu F$ ).
- 2) Derive an expression for gain of inverting operational amplifier.
- 3) Explain gas discharge plasma displays.

**B) Answer the following questions. (Any One)** **04**

- 1) Explain construction and working of a SCR.
- 2) Give the application of IC-555 as a linear ramp generator.

**Q.5 Answer the following questions. (Any Two) 14**

- Explain circuit operation and transfer characteristics of D-MOSFET.
- Explain segmental displays using LEDs.
- Explain construction, working and characteristics of a Triac.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**PHYSICS (Special Paper – XVI)**  
**Instrumentation**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 5:30 PM

Max. Marks: 70

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

**Q.1 Choose the correct alternatives from the options.****14**

- 1) \_\_\_\_\_ is active transducer.
  - a) Thermocouple
  - b) LVDT
  - c) Stain gauge
  - d) Thermistor
- 2) The secondary electron radiated back in scanning microscope is collected by \_\_\_\_\_.
  - a) specimen
  - b) anode
  - c) vacuum chamber
  - d) cathode
- 3) XPS is widely use for \_\_\_\_\_.
  - a) biological analysis
  - b) electrical analysis
  - c) chemical analysis
  - d) electromagnetic analysis
- 4) The range of wave number of near infrared spectroscopy is \_\_\_\_\_.
  - a) 4000-200  $\text{cm}^{-1}$
  - b) 12500-4000  $\text{cm}^{-1}$
  - c) 200-10  $\text{cm}^{-1}$
  - d) 50-1000  $\text{cm}^{-1}$
- 5) \_\_\_\_\_ arrangement for the sequence of the main component of a Uv/visible spectrometer is correct.
  - a) Light source → Monochromator → Sample Cell → Detector → Readout
  - b) Light source → Sample Cell → Monochromator → Detector → Readout
  - c) Light source → Monochromator → Detector → Sample Cell → Readout
  - d) Light source → Detector → Sample Cell → Detector → Readout
- 6) The region of the electromagnetic spectrum in which the highest energy photon are observed is the \_\_\_\_\_.
  - a) ultraviolet
  - b) infrared
  - c) microwave
  - d) X-ray
- 7) The Uv/ spectroscopy \_\_\_\_\_.
  - a) generates colored spectrum
  - b) can determine the concentration
  - c) can be used to make light visible
  - d) can determine the pH
- 8) \_\_\_\_\_ is similar to diffractometer.
  - a) Optical grating spectrometer
  - b) Photo multiplier
  - c) Prism spectrometer
  - d) Photovoltaic cell
- 9) Raman effect is scattering of \_\_\_\_\_.
  - a) molecules
  - b) protons
  - c) photons
  - d) neutrons



- 10) In Raman spectroscopy, the radiation lies in the \_\_\_\_\_ region.

|               |            |
|---------------|------------|
| a) micro wave | b) visible |
| c) UV         | d) X-ray   |
- 11) Mossbauer spectroscopy is also known as \_\_\_\_\_.

|                           |                           |
|---------------------------|---------------------------|
| a) beta ray spectroscopy  | b) alpha ray spectroscopy |
| c) theta ray spectroscopy | d) gamma ray spectroscopy |
- 12) The full form of MRI is \_\_\_\_\_.

|                               |                                 |
|-------------------------------|---------------------------------|
| a) magnetic resonance imaging | b) molecular resolution imaging |
| c) mass resonance imaging     | d) magnetic resolution imaging  |
- 13) Prompt emission of X-ray by an atom ionized by a higher energy X-ray is a \_\_\_\_\_ phenomena.

|                         |                    |
|-------------------------|--------------------|
| a) spontaneous emission | b) fluorescence    |
| c) luminescence         | d) phosphorescence |
- 14) Convert 0.379 absorbance in terms of transmissions.

|         |         |
|---------|---------|
| a) 41.8 | b) 54.8 |
| c) 12.7 | d) 14.8 |

**Q.2 A) Answer the following questions. (Any Four)** **08**

- 1) Define resolution and magnification.
- 2) List the optical spectroscopic techniques.
- 3) List the important features of Uv-Vis spectrometer.
- 4) What information does the XRD pattern of a crystal provide?
- 5) What is Mossbauer effect?

**B) Answer the following questions. (Any Two)** **06**

- 1) Describe piezoelectric transducer.
- 2) Draw labeled diagram of X-ray diffractometer.
- 3) State and explain the principle of XPS.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) What is an electron microscopy? Write the application of SEM.
- 2) Draw the labeled diagram Mossbauer spectroscopy and write the applications of it.
- 3) Write a note on ECG.

**B) Answer the following questions. (Any One)** **06**

- 1) What do you mean by transducer? Explain passive and active transducer.
- 2) State the applications of MRI and EEG.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) What is thermistor? Draw the symbol thermistor and explains the types of it.
- 2) Discus in brief MRI.
- 3) A beam of X-ray of wavelength  $0.071 \text{ nm}$  is diffracted by  $(110)$  plane or rock salt with lattice constant of  $0.28 \text{ nm}$ . Find the glancing angle for the second order diffraction.

**B) Answer the following questions. (Any One)** **04**

- 1) Distinguish between SEM and TEM.
- 2) Write the application of Raman spectroscopy.

**Q.5 Answer the following questions. (Any Two)**

- a)** Describe in brief servometer sensor.
- b)** Draw the labeled diagram of TEM and explain its working.
- c)** Explain in detail IR-spectroscopy.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov - 2022**  
**CHEMISTRY (Special Paper-XVI)**  
**Analytical Industrial Organic Chemistry**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

**Instructions:** 1) All questions are compulsory.  
 2) All questions carry equal marks.

**Q.1 Choose the correct alternatives from the options.****14**

- 1) Soaps are \_\_\_\_\_.  
 a) alkali metal salts of higher fatty acids  
 b) alkaline earth metal salts of higher fatty acids  
 c) alkali metal salts of higher fatty acid esters  
 d) alkaline earth metal salts of higher fatty acid esters
- 2) Dark coloured mechanical mixture of soap in soap solution is called as \_\_\_\_\_.  
 a) brine  
 b) nigre  
 c) lay  
 d) kettle
- 3) The molecular weight of \_\_\_\_\_ polymer is the sum of molecular weight of constituent monomer units.  
 a) condensation  
 b) copolymer  
 c) addition  
 d) natural
- 4) 1,3-Butadiene produces branched polymer due to \_\_\_\_\_ addition of monomer units.  
 a) 1,1  
 b) 1,2  
 c) 1,3  
 d) 1,4
- 5) Defecation is the process used in \_\_\_\_\_ of cane juice.  
 a) extraction  
 b) concentration  
 c) purification  
 d) dilution
- 6) The clarified sugar cane juice contains \_\_\_\_\_ % water.  
 a) 85  
 b) 15  
 c) 65  
 d) 35
- 7) The concept of umpolung refers to the \_\_\_\_\_.  
 a) reversal of carbon polarity  
 b) dehydration  
 c) hydrogenation  
 d) hydroxylation
- 8) Sodium borohydride ( $\text{NaBH}_4$ ) is \_\_\_\_\_ reagent  
 a) oxidizing  
 b) reducing  
 c) nitrating  
 d) brominating
- 9) \_\_\_\_\_ is a chemical agent which facilitates inter phase migration of reactants in bi-phase system.  
 a) ionic solvent  
 b) biocatalyst  
 c) MAQR  
 d) Phase transfer catalyst
- 10) Green chemistry suggests \_\_\_\_\_ principles to achieve.  
 a) 8  
 b) 12  
 c) 16  
 d) 10

- 11) The rate of flow value ( $R_f$ ) is the ratio of \_\_\_\_\_.  
 a) distance moved by solute to that by solvent front  
 b) distance moved by solvent front to by solute  
 c) distance moved by mobile phase to stationary phase  
 d) distance moved by stationary phase to mobile phase
- 12) In paper chromatography paper acts as \_\_\_\_\_.  
 a) solid phase  
 b) mobile phase  
 c) stationary phase  
 d) support
- 13) \_\_\_\_\_ is used as carrier gas in gas chromatography.  
 a) Helium  
 b) Oxygen  
 c) Ammonia  
 d) Carbon monoxide
- 14) Neoprene is polymer of \_\_\_\_\_.  
 a) ethane  
 b) styrene  
 c) 2-chlorobutadiene  
 d) vinyl chloride

- Q.2 A) Answer the following questions. (Any Four) 08**  
 1) What is natural rubber? Write structure of its monomer unit.  
 2) What are the steps involved in synthesis of Deriphat (sodium lauryl sarcosinate)?  
 3) What are thermosetting polymers?  
 4) Write any four characteristics of Bio-catalytic reactions.  
 5) What are Ionic liquids? Give two examples.
- B) Write short notes. (Any Two) 06**  
 1) Write a note on synthesis and uses of polystyrene.  
 2) Write a note on Microwave Assisted Reactions.  
 3) Write a note on umpolung and give its application in organic synthesis.
- Q.3 A) Answer the following questions. (Any Two) 08**  
 1) Explain in details cleansing action of soap.  
 2) What are polymers? Explain what are isotactic, syndiotactic and atactic polymers.  
 3) What are different by-products obtained from Sugar industry?
- B) Answer the following questions. (Any One) 06**  
 1) How soap is manufactured by Hot or Boiled process? Describe in details.  
 2) What are different types of Alcohol depending on the composition? What are different by-products of Alcohol industry?
- Q.4 A) Answer the following questions. (Any Two) 10**  
 1) How will you compare soaps with detergents?  
 2) Explain the methodology of Thin Layer Chromatography (TLC).  
 3) What are different synthetic applications of Selenium dioxide?
- B) Answer the following questions. (Any One) 04**  
 1) Write any four synthetic applications of Sodium Borohydride ( $\text{NaBH}_4$ ).  
 2) How will you prepare polyvinyl chloride (PVC) and novolac from its monomers?
- Q.5 Answer the following questions. (Any Two) 14**  
 a) What is Paper Chromatography? Discuss in details, mention its advantages.  
 b) Explain different processes involved in Refining of Raw Sugar.  
 c) How BUNA-S and BUNA-N rubber is manufactured from butadiene? Give its applications.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**BOTANY (Special Paper - XVI)**  
**Biostatistics**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Choose the correct alternatives from the options.****14**

- 1) Statistics performs functions such as \_\_\_\_\_.  
 a) Presentation Of Facts And Figures  
 b) Forecasting And Planning  
 c) Controlling And Exploring  
 d) All The Above
- 2) A variable taking all possible values in a certain range is called as \_\_\_\_\_.  
 a) Discrete Variable  
 b) Continuous  
 c) Nominal  
 d) Ordinal
- 3) Number of students in a class is an example of \_\_\_\_\_.  
 a) Discrete Variable  
 b) Continuous  
 c) Nominal  
 d) Ordinal
- 4) Primary data are collected by method of \_\_\_\_\_.  
 a) Direct personal investigation  
 b) Indirect oral investigation  
 c) Investigation through questionnaire  
 d) all the above
- 5) Data taken from the "Bulletin" will be considered as \_\_\_\_\_.  
 a) Primary data  
 b) Secondary data  
 c) Primary and secondary data  
 d) Neither a or b
- 6) The main purpose of diagrams and charts is \_\_\_\_\_.  
 a) To represent data in simple way  
 b) To avoid data in terms of text  
 c) To avoid tabulation  
 d) All the above
- 7)  $\bar{x}$  sign is used for \_\_\_\_\_.  
 a) Arithmetic Mean  
 b) Median  
 c) Mode  
 d) Deviation
- 8) Standard deviation was first worked out by \_\_\_\_\_.  
 a) Karl Pearson  
 b) Milton Friedman  
 c) Harvey Goldstein  
 d) Herman Hollerith
- 9) Mode is denoted by \_\_\_\_\_ sign.  
 a)  $\bar{x}$   
 b) *Me or Mdn*  
 c) *Moor Z*  
 d)  $\Sigma$
- 10) In a throw of coin what is the probability of getting tail?  
 a) 1  
 b) 2  
 c) 1/2  
 d) 0

- 11) In a throw of dice \_\_\_\_\_ is the probability of getting number greater than 5  
 a)  $1/2$  b)  $1/3$   
 c)  $1/5$  d)  $1/6$
- 12) A legume contains 40 seeds marked as 1 to 40. The probability of drawing a number multiple of 10 is \_\_\_\_\_.  
 a)  $5/40$  b)  $4/40$   
 c)  $3/40$  d)  $2/40$
- 13) In column charts, bars are \_\_\_\_\_.  
 a) Vertical b) Horizontal  
 c) False base line d) None of above
- 14) The test of significance used specially for large size samples is \_\_\_\_\_.  
 a) *t-test or student's t test* b) *chi square test*  
 c) *a and b test* d) *None of the above*

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Give the definition of biostatistics.
- 2) Define variable with any suitable example.
- 3) Define histogram.
- 4) Give the formula to calculate probability.
- 5) What is mean by arithmetic mean?

**B) Write notes on (Any two) 06**

- 1) Sampling methods.
- 2) Difference between primary and secondary data.
- 3) Merits and demerits of Median.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) Mention merits and demerits secondary data.
- 2) What is range? Find out the range of following data by using formula.  
70, 50, 60, 90, 80, 65, 40, 75, 55 and 85.
- 3) Write short note on student's *t*-test.

**B) Answer the following questions. (Any One) 06**

- 1) Discuss merits and demerits of mean deviation.
- 2) Mention the functions of biostatistics.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Write note on two-dimensional diagrams.
- 2) Write short note on chi square test.
- 3) Describe the different types of probability.

**B) Answer the following questions. (Any One) 04**

- 1) Describe the basic principles of biostatistics.
- 2) Find out the probability of getting (i) Head, (ii) Tail, when single coin is tossed?

**Q.5 Answer the following questions. (Any Two) 14**

- a) Mention the sources of secondary data.
- b) Describe the different sampling methods.
- c) Calculate the S. D. of the following data on the heights (in cm) of 10 plants:  
73, 75, 80, 42, 57, 65, 52, 42, 47, 67.

Set P

Max. Marks: 70

- 11) Adrenal cortex secretes \_\_\_\_\_.  
a) adrenaline  
b) calcitonin  
c) epinephrine  
d) aldosterone
- 12) An autoimmune disease in which an antibody mimic the action of TSH is \_\_\_\_\_.  
a) myxedema  
b) cretinism  
c) acromegaly  
d) Grave's disease
- 13) The hormone responsible for regulation of calcium and phosphorus metabolism is secreted by \_\_\_\_\_ gland.  
a) pancreas  
b) adrenal  
c) thyroid  
d) parathyroid
- 14) \_\_\_\_\_ habitat show least animal diversity.  
a) Desert  
b) Tropic  
c) Temperate  
d) Grassland

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) GnRH.
- 2) Pesticides.
- 3) Islets of Langerhans.
- 4) Bio-Magnification.
- 5) Histological structure of thyroid.

**B) Write note. (Any Two)** **06**

- 1) What are Toxicants?
- 2) Rocky shore animal adaptation
- 3) Biological Indicators

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Explain neurosecretory hormones.
- 2) Action of acetylcholine.
- 3) Desert habitat.

**B) Answer the following questions. (Any One)** **06**

- 1) Solid waste management.
- 2) Explain animal ethics, give brief account on prevention of cruelty to animals.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Waste water management.
- 2) Toxic agents as metals.
- 3) Explain hormones of Pineal gland and its functions.

**B) Answer the following questions. (Any One)** **04**

- 1) Faunal adaptation in lentic water ecosystem.
- 2) Histological structure of adrenal gland.

**Q.5 Answer the following questions. (Any Two) 14**

- Describe characteristic of sea habitat and give the faunal adaptation.
- Discuss the roles and disorders of hormones of Islets of Langerhan's.
- Give an account on rain water harvesting.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester – VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**ZOOLOGY (Special Paper – XVI)**  
**Techniques in Biology**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Rewrite the following sentences by choosing the correct alternatives. 14**

- 1) The working principle of calorimeter is based on \_\_\_\_\_.  
 a) Working properties of light      b) Absorption of light  
 c) R.I. of light      d) None of the above
- 2) The basicity of given sample is measured from the device \_\_\_\_\_.  
 a) Calorimeter      b) pH meter  
 c) Balance      d) Spectrometer
- 3) The full form of TLC is \_\_\_\_\_.  
 a) Thin liquid chromatography      b) Thin layer chromatography  
 c) Thick liquid chromatography      d) Thick layer chromatography
- 4) In western blotting \_\_\_\_\_.  
 a) Agarose gel is commonly used  
 b) Polyacrylamide is commonly used  
 c) High resolution gel  
 d) Both a & b
- 5) Gel electrophoresis is the most common method used for the purification and separation of \_\_\_\_\_.  
 a) DNA and Proteins      b) DNA and RNA  
 c) RNA and Proteins      d) DNA, RNA and Proteins
- 6) DNA finger printing was first invented for the purpose of \_\_\_\_\_.  
 a) Paternity Testing  
 b) Identify victims of war  
 c) Diagnosis and Treating diseases  
 d) None of these
- 7) Full form of PCR is \_\_\_\_\_.  
 a) Polymer Chain Reaction      b) Protein Chain Reaction  
 c) Polymer Chemical Reaction      d) Protein Chemical Reaction
- 8) The preservation of biological material in the frozen state is called as \_\_\_\_\_.  
 a) Fixation      b) Block preparation  
 c) Preservation      d) Cryopreservation
- 9) PCR is discovered by \_\_\_\_\_.  
 a) Kary Mullis      b) Hooke  
 c) Hardy      d) Watson
- 10) Radioactivity discovered by \_\_\_\_\_.  
 a) Becquerel      b) Jaffrey  
 c) Roseland      d) Crick

- 11)** \_\_\_\_\_ is the machine that spins in order to separate out components making up a mixture.
- a) Centrifuge                      b) Rotator  
c) Calorimeter                  d) Balance
- 12)** \_\_\_\_\_ technology is used in forensic science.
- a) DNA foot printing            b) DNA finger printing  
c) Staining                        d) All of above
- 13)** Autoradiography was first discovered by \_\_\_\_\_.
- a) Curies                             b) Robertson  
c) Hooke                            d) Crick
- 14)** DNA chip is also known as \_\_\_\_\_.
- a) Biochip                          b) DNA microarray  
c) DNA microtomy              d) All above

**Q.2 A) Answer the following questions. (Any Four)** **08**

- 1) pH meter
- 2) Aim of the separation technique
- 3) Principle of PCR
- 4) Role of stem cell
- 5) Uses of Microtomy

**B) Write short notes. (Any Two)** **06**

- 1) Applications of Calorimeter
- 2) Double staining procedure
- 3) DNA chip

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) PAS staining method.
- 2) Describe methodology of microtomy up to sectioning.
- 3) Give an account on Feulgen Technique.

**B) Answer the following questions. (Any One)** **06**

- 1) Describe the procedure of column chromatography.
- 2) Give an account on DNA barcoding.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Describe the Southern blotting technique.
- 2) Describe the Cryopreservation of gametes and its applications.
- 3) Uses of electrophoresis

**B) Answer the following questions. (Any One)** **04**

- 1) Write in brief Ultracentrifugation.
- 2) Steps of PCR technique

**Q.5 Answer the following questions. (Any Two) 14**

- 1) Definition of Microtomy. Explain the method of microtomy.
- 2) Describe types of centrifugation.
- 3) Describe in detail the DNA finger printing.

**Seat  
No.**

## Max. Marks: 70

14

1)  $L^{-1} \left\{ \frac{s}{2s^2 - 8} \right\} = \underline{\hspace{2cm}}.$

a)  $\sinh 2t$

b)  $\frac{\cos h2t}{2}$

c)  $\frac{\cos ht}{2}$

d)  $\frac{\cos 2t}{2}$

2) If  $L\{F(t)\} = f(p)$  then  $L\{e^{at} \cos 2t\} = \underline{\hspace{2cm}}$ .

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

$$\text{a) } \frac{2}{(p-a)^2 + 4}$$

$$\text{b) } \frac{p-a}{(p-a)^2 + 4}$$

c)  $\frac{p}{(p-a)^2 + 4}$

d)  $\frac{1}{(p-a)^2 + 4}$

**3)** If  $L\{F(t)\} = f(p)$  then  $L^{-1}\{f(3p)\} = \underline{\hspace{2cm}}$ .

a)  $F(t/3)$

$$\text{b) } \frac{1}{g} F(t/3)$$

c)  $\frac{1}{3}F(t/3)$

d)  $\frac{1}{3}F(3t)$

**4)**  $L^{-1} \left\{ \frac{1}{(p-3)(p+4)} \right\} = \underline{\hspace{2cm}}.$

a)  $\frac{1}{7}(e^{3t} - e^{-4t})$

$$\text{b) } \frac{e^{3t} - e^{-4t}}{3}$$

c)  $e^{-4t} - e^{3t}$

d)  $\frac{e^{-4t} + e^{3t}}{7}$

**5)** If  $L^{-1}\{f(p)\} = F(t)$  and  $F(0) = 0$  then  $L^{-1}\{pf(p)\} = \underline{\hspace{2cm}}$ .

a)  $\frac{F(t)}{t}$

b)  $F''(t)$

c)  $F'(t)$

d)  $tF(t)$

6) The initial value theorem is \_\_\_\_\_.

a)  $\lim_{t \rightarrow \infty} F(t) = \lim_{p \rightarrow 0} pf(p)$

$$\text{b) } \lim_{p \rightarrow \infty} f(p) = \lim_{t \rightarrow \infty} F(t)$$

c)  $\lim_{p \rightarrow \infty} pf(p) = \lim_{t \rightarrow \infty} F(t)$

d)  $\lim_{t \rightarrow 0} F(t) = \lim_{p \rightarrow \infty} p f(p)$



- Q.2 A) Answer the following questions. (Any Four) 08**
- 1) Find  $L\{\cos h at - \cos at\}$
  - 2) Determine the Laplace transform of  $\sin^2 at$ .
  - 3) If  $L^{-1}\{f(P)\} = F(t)$  then prove that  $L^{-1}\{f(p-a)\} = e^{at}F(t)$
  - 4) Find  $L^{-1}\left\{\frac{P+2}{P^2-2P+5}\right\}$
  - 5) Using Heavy-Side's expansion formula find  $L^{-1}\left\{\frac{1}{(p-1)(p-2)(p+3)}\right\}$
- B) Write note. (Any Two) 06**
- 1) Find  $L\left\{\frac{\sin at}{t}\right\}$  does the laplace transform of  $\frac{\cos at}{t}$  exist.
  - 2) If  $y = y(x, t)$  then prove that  $L\left\{\frac{\partial^2 y}{\partial t^2}\right\} = p^2 \bar{y}(x, p) - py(x, 0) - y_t(x, 0)$
  - 3) State and prove second shifting theorem for inverse Laplace transform.
- Q.3 A) Answer the following questions. (Any Two) 08**
- 1) If  $F(t) = t^2$   $0 < t < 2$  and  $F(t+2) = F(t)$  find  $L\{F(t)\}$
  - 2) Prove the final value theorem for Laplace transform.
  - 3) Find  $L^{-1}\left\{\frac{p}{(p^2+a^2)^2}\right\}$
- B) Answer the following questions. (Any One) 06**
- 1) Using Laplace transform solve  

$$x''(t) + 4x'(t) + 4x(t) = 4e^{-2t} \text{ with } x(0) = -1 \quad x'(0) = 4$$
  - 2) State and prove the convolution theorem for inverse Laplace transform.
- Q.4 A) Answer the following questions (Any Two) 10**
- 1) If  $L\{F(t)\} = f(p)$  then prove that  $L\{t^n F(t)\} = (-1)^n \frac{d^n}{dp^n} f(p)$
  - 2) Show that  $\int_0^\infty \cos x^2 dx = \frac{\sqrt{\pi/2}}{2}$
  - 3) Apply Laplace transform to solve  

$$\frac{\partial y}{\partial x} - \frac{\partial y}{\partial t} = 1 - e^{-t} \quad 0 < x < 1 \quad t > 0 \quad y(x, 0) = x$$
- B) Answer the following questions. (Any One) 04**
- 1) Show that  $L\{(1 + te^{-t})^3\} = \frac{1}{P} + \frac{3}{(p+1)^2} + \frac{6}{(p+2)^3} + \frac{6}{(p+3)^4}$
  - 2) Find  $L^{-1}\left\{\frac{e^{4-3P}}{(p+4)^{5/2}}\right\}$
- Q.5 Answer the following questions. (Any Two) 14**
- a) Using Laplace's transform solve the equation  

$$\frac{dx}{dt} + \frac{dy}{dt} = t \quad \frac{d^2x}{dt^2} - y = e^{-t}$$
 given that  $x(0) = 0 \quad y(0) = 0 \quad \frac{dx}{dt} = 0$  at  $t = 0$
  - b) Find the inverse Laplace transform of  $\frac{2P^3+2P^2+4P+1}{(P^2+1)(P^2+P+1)}$
  - c) Find  $L\{\sin \sqrt{t}\}$  and  $L\left\{\frac{\cos \sqrt{t}}{\sqrt{t}}\right\}$

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|       |
|-------|
| Set P |
|-------|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov -2022**  
**STATISTICS (Special Paper- XVI)**  
**Quality Management and Reliability**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

- Instructions:** 1) All questions are compulsory.  
 2) Figures to the right indicate full marks.  
 3) Use of simple or scientific calculators.  
 3) Graph papers will be supplied if requested.

**Q.1 Choose the correct alternatives from the following options. 14**

- 1) Shewhart control charts are insensitive to \_\_\_\_\_ process shifts.
  - a) Small ( $< 1.5\sigma$ )
  - b) Medium ( $1.5\sigma < \text{shift} < 3\sigma$ )
  - c) Big ( $> 6\sigma$ )
  - d) Very big
- 2) Cusum control charts were originated in \_\_\_\_\_.
  - a) 1920s
  - b) 1950s
  - c) 1960s
  - d) 1980s
- 3) What is the full form of M in the EWMA chart?
  - a) Mean
  - b) Motion
  - c) Median
  - d) Moving
- 4) EWMA charts are better than Shewhart control charts in detecting the \_\_\_\_\_ shifts.
  - a) Small process
  - b) Medium process
  - c) Large process
  - d) None of these
- 5) What DMAIC process does is, to \_\_\_\_\_.
  - a) Manufacture any product
  - b) Define specification limits for a product
  - c) Solve root cause of quality and process problems
  - d) Define quality system standards
- 6) The purpose of Acceptance sampling is to \_\_\_\_\_.
  - a) Sentence lots
  - b) Estimate lot quality
  - c) Estimate lot defectives
  - d) Estimate lot conformity
- 7) What is done in single sampling plan?
  - a) Only one unit is checked
  - b) Only the first lot is checked 100%
  - c) Only one sample of  $n$  units is checked
  - d) Only  $n$  samples of 1 unit are checked
- 8) In a Single Sampling Plan if the lot size  $N$  is large relative to the sample size  $n$ , then we may write the equation of AOQ approximately as \_\_\_\_\_.
  - a)  $pnP_a$
  - b)  $(1 - p)P_a$
  - c)  $pP_a$
  - d) None of these
- 9) Which of these is not a part of magnificent seven of SPC?
  - a) Pareto chart
  - b) Check sheet
  - c) Scatter diagram
  - d) 2k factorial design

- 10) Pareto chart identifies the \_\_\_\_\_ defects not the \_\_\_\_\_ defects.  
 a) The most important, the most frequent  
 b) The smallest defects, the largest defects  
 c) The most frequent, the most important  
 d) The largest defects, the smallest defects
- 11) A set of components whose functioning ensures the functioning of the system is known as \_\_\_\_\_.  
 a) path set  
 b) cut set  
 c) minimal cut set  
 d) minimal path set
- 12) The structure function  $\phi(X)$  of a series system of 2 components is \_\_\_\_\_.  
 a)  $x_1x_2$   
 b)  $x_1 + x_2$   
 c)  $1 - x_1x_2$   
 d) None of these
- 13) Exponential distribution is \_\_\_\_\_.  
 a) IFR  
 b) DFR  
 c) Both a & b  
 d) None of these
- 14) Cut vector of a parallel system of 2 components is \_\_\_\_\_.  
 a) (1, 1)  
 b) (1, 0)  
 c) (0, 1)  
 d) None of these

**Q.2 A) Attempt any four of the following questions. 08**

- 1) What is the meaning of Quality?
- 2) When does a series system function?
- 3) Define AOQL.
- 4) State the formula of one-sided upper cusum statistic  $C_i^+$ .
- 5) Define a structure function of a parallel system of two components.

**B) Attempt any two of the following questions. 06**

- 1) What is the value of upper control limit for the period  $i = 1$  for a EWMA chart which has value of  $\lambda = 0.10, L = 2.7, \sigma = 1$  and the value of  $\mu_0 = 15$ ?
- 2) If the value of  $\bar{x}_i = 9.29$  and  $C_{i-1} = -1.56$ , what will be the value of the cumulative sum  $C_i$  for this sample, if the value of  $\mu_0 = 12$ .
- 3) In a single sampling plan if sample size  $n = 7$ , acceptance number  $C = 2$ , and lot quality  $p = 0.07$ , find the probability of accepting the lot by using binomial distribution.

**Q.3 A) Attempt any two of the following questions. 08**

- 1) Find the minimal cut sets of a series system of two components.
- 2) Find the reliability of a parallel system of 3 independent components whose reliabilities are  $p_1 = p_2 = p_3 = 0.5$
- 3) Find ATI for single sampling plan.

**B) Attempt any one of the following questions. 06**

- 1) Show that hazard rate of series system of components having independent life times is summation of components' hazard rates.
- 2) Write a note on Six Sigma methodology.

**Q.4 A) Attempt any two of the following questions. 10**

- 1) Write a note on a magnificent tool of quality – Control chart.
- 2) Write a note on a magnificent tool of quality – Histogram.
- 3) Write the procedure of single sampling plan.

**B) Attempt any one of the following questions. 04**

- 1) State the steady-state control limits of EWMA control chart for monitoring process mean.
- 2) In reliability theory, when a system is said to be coherent?

**Q.5 Attempt any two of the following questions. 14**

- a) Explain the Tabular CUSUM for monitoring the process mean.
- b) Suppose a shirt manufacturing company supplies shirts in lots of size 500 to the buyer. A double sampling plan with  $n_1 = 10$ ,  $C_1 = 0$ ,  $n_2 = 25$ ,  $C_2 = 1$  is being used for the lot inspection. The company and the buyer's quality control inspector decide that AQL = 0.04. Compute the producer's risk for this sampling plan. Assume number of defective items found in the samples follows binomial distribution.
- c) Life time of components of a series system of two independent components follow exponential distribution with parameters  $\theta_1 = 0.2$  and  $\theta_2 = 0.05$  respectively. Find the survival function of the system.



|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**STATISTICS (Special Paper -XVI)**  
**Time Series Analysis**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

**Instructions:** 1) All questions are compulsory and figures to the right indicate full marks.  
 2) Use of scientific calculators and statistical tables is allowed.  
 3) Graph papers are to be supplied on demand.

**Q.1 Choose the correct alternatives from the options.** **14**

- 1) Long term fluctuations in time series are called \_\_\_\_\_ variations.
  - a) seasonal
  - b) trend
  - c) cyclical
  - d) irregular
- 2) In single exponential smoothing if smoothing constant is 0 then \_\_\_\_\_.
  - a)  $F_{t+1} = \text{constant}$
  - b)  $F_{t+1} = F_t$
  - c) both (a) and (b)
  - d) neither (a) nor (b)
- 3) Single exponential smoothing is appropriate when there is \_\_\_\_\_.
  - a) no upward trend
  - b) no downward trend
  - c) both (a) and (b)
  - d) neither (a) nor (b)
- 4) In time plot \_\_\_\_\_.
  - a) the observations are plotted against time observations
  - b) the scatter points are joined with free hand curve
  - c) the various components are removed
  - d) all of these
- 5) In fitting the straight line of the form  $y = a + bt$ , value of slop b is independent of \_\_\_\_\_.
  - a) origin
  - b) scale
  - c) both (a) and (b)
  - d) neither (a) nor (b)
- 6) Sum of half yearly seasonal indices in multiplicative model is \_\_\_\_\_.
  - a) 0
  - b) 200
  - c) 400
  - d) 600
- 7) If  $T = 500$ ,  $S = 90\%$ ,  $C = 80\%$ ,  $I = 120\%$  then under multiplicative model value of time series is = \_\_\_\_\_.
  - a) 342
  - b) 324
  - c) 432
  - d) None of these
- 8) The first thing to do in time series analysis is \_\_\_\_\_.
  - a) plot the data
  - b) identify the components at work
  - c) delete the effect of various components
  - d) all of these
- 9) In moving average method with period 'm' we can not find trend values for \_\_\_\_\_ periods.
  - a) first time point
  - b) last time point
  - c) total m time points
  - d) total (m+1) time points

- 10) Share index is recorded daily for 6 months. This data shows \_\_\_\_\_.  
 a) increasing trend                      b) decreasing trend  
 c) seasonal variation                      d) cyclic fluctuations
- 11) When components in time series are independent \_\_\_\_\_ model is suitable.  
 a) additive                                      b) Multiplicative  
 c) both (a) and (b)                      d) neither (a) nor (b)
- 12) For AR(1) model  $Y_t = a Y_{t-1} + b + \epsilon$ , we assume that \_\_\_\_\_.  
 a) series need not be stationary                      b)  $|a_1| < 1$   
 c) both (a) and (b)                      d) neither (a) nor (b)
- 13) For AR(2) model  $Y_t = a_1 Y_{t-1} + a_2 Y_{t-2} + b + \epsilon$ , the process is stationary if \_\_\_\_\_.  
 a)  $|a_1| = |a_2|$                                       b)  $|a_1| + |a_2| < 1$   
 c)  $|a_1| + |a_2| > 1$                                       d) None of these
- 14) Suppose time series data are available for 50 months and suppose we lag the series by 1 month. Then \_\_\_\_\_ pairs will be available for computing autocorrelation.  
 a) 25                                              b) 48  
 c) 49                                              d) 50

**Q.2 A) Answer the following questions. (Any Four)**

**08**

- 1) Define time series.
- 2) How would convert annual trend equation to monthly trend equation?
- 3) Define seasonal fluctuation with suitable illustration.
- 4) Write the forecasting model of single exponential smoothing.
- 5) Fill in the blanks : In ratio to moving average method for quarterly data, the sum of seasonal indices is --- for additive model and it is --- for multiplicative model.

**B) Write short notes. (Any Two)**

**06**

- 1) Suppose the last period forecast was 70 and demand was 60. What is the single exponential smoothing forecast with  $\alpha = 0.4$  for next period?
- 2) Describe additive model in time series.
- 3) Write three examples of trend.

**Q.3 A) Answer the following questions. (Any Two)**

**08**

- 1) Define period of moving average and explain when, how and why you obtain centered moving averages.
- 2) Discuss utility of time series analysis.
- 3) Write merits and demerits of least square method.

**B) Answer the following questions. (Any One)**

**06**

- 1) Obtain the quarterly seasonal indices by simple average method assuming absence of trend.

| Quarter →<br>Year ↓ | I  | II | III | IV |
|---------------------|----|----|-----|----|
| 2010                | 40 | 38 | 35  | 33 |
| 2011                | 37 | 39 | 36  | 36 |
| 2012                | 40 | 41 | 33  | 31 |
| 2013                | 33 | 44 | 40  | 40 |

- 2) Describe in detail ratio to moving average method.

**Q.4 A) Answer the following questions. (Any Two)****10**

- 1) Compare moving average method and exponential smoothing.
- 2) Draw a time plot for the following time series data

|       |     |     |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Year  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   | 10  |
| Value | 130 | 127 | 124 | 135 | 140 | 132 | 129 | 127 | 145 | 158 |

- 3) State the specific components that can be observed in following time series.
  - i) Variation in quality of a product when production is under statistical control.
  - ii) Daily record of gold prices in one month.
  - iii) Stock of luxurious articles in departmental stores.
  - iv) online transactions and purchases.
  - v) Reduced production in a factory due to strike.

**B) Answer the following questions. (Any One)****04**

- 1) Fit a straight-line trend to the following data.

|                     |      |      |      |      |      |      |      |
|---------------------|------|------|------|------|------|------|------|
| Year                | 1989 | 1990 | 1991 | 1992 | 1993 | 1994 | 1995 |
| Profit in thousands | 95   | 105  | 107  | 98   | 109  | 107  | 119  |

- 2) Explain moving average method of trend estimation.

**Q.5 Answer the following questions. (Any Two)****14**

- a) Explain how would you determine the period of moving average for the following data. Use this period to estimate trend values.

|       |     |     |     |     |     |     |     |     |     |
|-------|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Year  | 1   | 2   | 3   | 4   | 5   | 6   | 7   | 8   | 9   |
| Value | 130 | 127 | 140 | 135 | 150 | 155 | 148 | 156 | 160 |

- b) Write a note on AR(1) model.
- c) Use double exponential smoothing to forecast time series value for one period, two periods and three periods ahead, using following data and when  $\alpha = 0.501$  and  $\beta = 0.072$

|                |     |     |     |     |     |
|----------------|-----|-----|-----|-----|-----|
| T              | 1   | 2   | 3   | 4   | 5   |
| Y <sub>t</sub> | 143 | 152 | 161 | 139 | 137 |

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

|     |   |
|-----|---|
| Set | P |
|-----|---|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov - 2022**  
**GEOLOGY (Special Paper-XVI)**  
**Applied Geology Part – II**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Fill in the blanks with correct answer from given options.**

**14**

- 1) Gamma rays in electromagnetic spectrum has \_\_\_\_\_.  
 a) Short wavelength and high frequency  
 b) long wavelength and high frequency  
 c) Short wavelength and low frequency  
 d) long wavelength and low frequency
- 2) Nadir point on the terrain is represented by \_\_\_\_\_ point on the aerial photograph.  
 a) Principal  
 b) Principle  
 c) Printed  
 d) None of these
- 3) Band number 5 of LANDSAT is \_\_\_\_\_.  
 a) NIR - near-infrared  
 b) SWIR - short wave infrared  
 c) TIR-Thermal infrared  
 d) Blue
- 4) In the low oblique aerial photographs tilt angle of the axis is \_\_\_\_\_.  
 a)  $5^{\circ}$ - $6^{\circ}$   
 b)  $20^{\circ}$ - $30^{\circ}$   
 c)  $30^{\circ}$ - $60^{\circ}$   
 d)  $60^{\circ}$ - $90^{\circ}$
- 5) Sandstones show \_\_\_\_\_ tone in the aerial photograph.  
 a) black  
 b) dark  
 c) intermediate  
 d) light
- 6) Raster data is a type of \_\_\_\_\_ data.  
 a) Numerical  
 b) Non-spatial  
 c) Spatial  
 d) Vector
- 7) Basic elements of vector data are \_\_\_\_\_.  
 a) Point  
 b) Line  
 c) Polygon  
 d) All of these
- 8) Which one of the following data is represented in grid form?  
 a) Point  
 b) Line  
 c) Polygon  
 d) Raster
- 9) Which one of the following instruments is NOT used in field?  
 a) Chisel  
 b) Pocket stereoscope  
 c) Compass-clinometers  
 d) Goniometer
- 10) The tube bubble in Brunton compass is used while measuring \_\_\_\_\_.  
 a) Strike  
 b) Dip angle  
 c) Bearing  
 d) Trend of fault

- 11) Which one of the following is vector quantity?
  - a) Elevation
  - b) Strike
  - c) Dip
  - d) None of these
- 12) Which one of the following colours in the visible spectrum has maximum frequency?
  - a) Red
  - b) Green
  - c) Violet
  - d) Yellow
- 13) Thermal IR spans the \_\_\_\_\_ range in the electromagnetic spectrum.
  - a)  $3.0 - 100\mu m$
  - b)  $0.8 - 3.0\mu m$
  - c)  $0.4 - 0.8\mu m$
  - d)  $0.1 - 0.4\mu m$
- 14) Wavelengths of \_\_\_\_\_ region falling on water surface are completely absorbed by water.
  - a) Visible
  - b) IR
  - c) UV
  - d) Radio

**Q.2 A) Answer the following questions. (Any Four)** **08**

- 1) Define Geographic information System.
- 2) What is range of microwave in electromagnetic spectrum?
- 3) What is false colour composite?
- 4) What are two data types in GIS?
- 5) India falls in which zones of UTM?

**B) Write notes. (Any Two)** **06**

- 1) Explain two types of base maps.
- 2) What is Spectral resolution?
- 3) Advantages of raster data structure.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) What are the parameters required to describe lithology in the field?
- 2) Describe components of GIS.
- 3) Describe types of aerial photographs depending on optical axis position?

**B) Answer the following questions. (Any One)** **06**

- 1) What is buffer analysis? Explain one application in geology?
- 2) Write note on non-spatial data.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Explain the construction of simple lens stereoscope.
- 2) How can be folds interpreted on aerial photograph.
- 3) Distinguish planimetric maps from topographic maps and briefly outline their specific uses.

**B) Answer the following questions. (Any One) 04**

- 1) What is radiance?
- 2) Differentiate vector and raster data.
- 3) What are data input methods in GIS?

**Q.5 Answer the following questions. (Any Two)** **14**

- What are atmospheric windows?
- Describe in detail tone of aerial photographs.
- Describe methods of locating field data on a base map?

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester – VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**MICROBIOLOGY (Special Paper - XVI)**  
**Clinical Microbiology - I**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Choose the correct alternative from the following options. 14**

- 1) Streptomycin inhibits \_\_\_\_\_ synthesis in bacteria.
  - a) Cell wall
  - b) Protein
  - c) Lipid
  - d) Cell membrane
- 2) \_\_\_\_\_ is venereal disease transmitted by sexual contact.
  - a) Syphilis
  - b) Malaria
  - c) Typhoid
  - d) Dysentery
- 3) The genome of Hepatitis B virus is \_\_\_\_\_.
  - a) DS RNA
  - b) SS DNA
  - c) SS RNA
  - d) DS DNA
- 4) \_\_\_\_\_ is Gram positive, spore bearing anaerobic rod shaped pathogen.
  - a) Pseudomonas aeruginosa
  - b) Vibrio cholera
  - c) Mycobacterium tuberculosis
  - d) Clostridium perfringens
- 5) Hydrophobia is symptom of \_\_\_\_\_.
  - a) Hepatitis
  - b) Rabies
  - c) Filariasis
  - d) Malaria
- 6) Negler's reaction is shown by \_\_\_\_\_.
  - a) Cl. perfringens
  - b) Ps. Aeruginosa
  - c) Myc. Tuberculosis
  - d) Hepatitis B.
- 7) The gastric and duodenal ulcer is caused by \_\_\_\_\_.
  - a) Pseudomonas
  - b) Vibrio
  - c) H. pylori
  - d) Shigella
- 8) \_\_\_\_\_ is cyclic polypeptide antibiotic produced by Bacillus subtilis.
  - a) Bacillin
  - b) Subtilin
  - c) Penicillin
  - d) Bacitracin
- 9) Complete Hepatitis B virus particle is known as \_\_\_\_\_.
  - a) Australia antigen
  - b) HAV
  - c) Cowdry bodies
  - d) Dane particles
- 10) \_\_\_\_\_ inhibits cell wall synthesis in bacteria.
  - a) Streptomycin
  - b) Penicillin
  - c) Chloramphenicol
  - d) Sulphonamides
- 11) \_\_\_\_\_ is not a viral disease.
  - a) Syphilis
  - b) Rabies
  - c) Hepatitis
  - d) HIV

- 12)** Plasmodium reproduces sexually in the \_\_\_\_\_.  
a) Human  
b) Air  
c) Mosquito  
d) Water
- 13)** Typical lesions caused by Herpes virus is called \_\_\_\_\_.  
a) Chancre  
b) Impetigo  
c) Carbuncle  
d) Fever blister
- 14)** The incubation period of Ebola virus is \_\_\_\_\_ days.  
a) 1-2  
b) 8-10  
c) 3-4  
d) 15-20

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Define Antimicrobials.
- 2) Define prophylaxis.
- 3) Define Mycology.
- 4) Define pathogenesis.
- 5) Give two examples of broad-spectrum antibiotics.

**B) Write Short Notes. (Any Two)** **06**

- 1) Leptospirosis
- 2) Properties of ideal antimicrobial drugs
- 3) Swine flu

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Describe the mechanism of action of antibiotics acting on cell wall.
- 2) Describe in brief Rabies.
- 3) Describe in brief Candidiasis.

**B) Answer the following question. (Any One)** **06**

- 1) Describe in detail AIDS.
- 2) Describe the mechanism of drug resistance.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Describe in brief Malaria.
- 2) Describe in detail Syphilis.
- 3) Describe in brief Gas gangrene.

**B) Answer the following question. (Any One)** **04**

- 1) Discuss in detail Antifungal drugs.
- 2) Discuss in brief Aspergillosis.

**Q.5 Answer the following questions. (Any Two)** **14**

- Write an essay on Tuberculosis.
- Describe in detail Hepatitis A and B infections.
- Describe the various methods of antibiotic sensitivity testing.

**Seat  
No.**

## Max. Marks: 70

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

14

- 1) If pathogenicity / virulence of toxin is removed by heat or chemicals it is called \_\_\_\_\_.  
a) toxoid  
b) antitoxin  
c) exotoxin  
d) endotoxin
- 2) Swine flu is a \_\_\_\_\_ borne disease.  
a) water  
b) air  
c) fungal  
d) arthropod
- 3) *Pseudomonas* is an example of \_\_\_\_\_.  
a) gram positive bacteria  
b) gram negative bacteria  
c) actinomyces  
d) virus
- 4) Organism produces swarming growth on culture media is \_\_\_\_\_.  
a) *Escherichia*  
b) *Proteus*  
c) *Klebsiella*  
d) *Shigella*
- 5) Blood agar medium is \_\_\_\_\_ medium.  
a) enriched  
b) selective  
c) differential  
d) both a and c
- 6) \_\_\_\_\_ is NOT a viral disease.  
a) Hepatitis A  
b) Rabies  
c) Malaria  
d) HIV
- 7) Causative agent for bacillary Tuberculosis is \_\_\_\_\_.  
a) *E. coli*  
b) *M. leprae*  
c) *Shigella*  
d) *M. tuberculosis*
- 8) HIV is transmitted through \_\_\_\_\_.  
a) food  
b) air  
c) water  
d) blood
- 9) \_\_\_\_\_ is acid fast bacterium.  
a) *Neisseria gonorrhoeae*  
b) *Staphylococcus aureus*  
c) *Mycobacterium tuberculosis*  
d) *Klebsiella pneumoniae*
- 10) Germ tube test is used for the diagnosis of \_\_\_\_\_.  
a) Typhoid fever  
b) AIDS  
c) Syphilis  
d) Candidiasis
- 11) The reduction of virulence of a microorganism is known as \_\_\_\_\_.  
a) Attenuation  
b) Exaltation  
c) Inactivation  
d) Tyndalization



- 12)** The Oxidase test is positive and used for identification of \_\_\_\_\_.  
a) *Salmonella*                      b) *Pseudomonas*  
c) *Pneumococcus*                  d) *Staphylococcus*
- 13)** The interval period between HIV infection and appearance of antibodies in serum is called \_\_\_\_\_ period.  
a) Intrinsic                              b) incubation  
c) window                                d) Interval
- 14)** On Mac Conkey's agar medium *Klebsiella* species forms \_\_\_\_\_ colonies.  
a) Colourless                            b) greenish  
c) Pink                                      d) yellow

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) What is biomedical waste management?
- 2) What is CDC?
- 3) What is Acid fast organism?
- 4) What are Toxoids?
- 5) Define the Vaccine.

**B) Write note. (Any Two) 06**

- 1) Cultural properties of *Escherichia coli*
- 2) Isolation of members of *Enterobacteriaceae*
- 3) Vitek-2 system in identification of bacteria

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Nosocomial infection
- 2) Use of Biological warfare
- 3) What is Pathogenicity?

**B) Answer the following questions. (Any One)** **06**

- 1) Emerging and re-emerging of diseases causing epidemics and pandemics
- 2) Disposal of waste

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) Role of WHO in prevention of diseases
- 2) Use of BACTEK
- 3) Differentiate between is toxin and toxoid

**B) Answer the following questions. (Any One)** **04**

- 1) What is Biotyping serotyping and Phage typing?
- 2) How to control of epidemics of diseases?

**Q.5 Answer the following questions. (Any Two) 14**

- a) Amoebiasis
- b) Human immunodeficiency virus
- c) Live attenuated vaccines

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- 12)** \_\_\_\_\_ function is used to replace the element in an existing order.
- a) Bundle
  - b) unbundle
  - c) bundle by name
  - d) unbundle by name
- 13)** G Programming Language is \_\_\_\_\_.
- a) Graphical
  - b) Textual
  - c) Simple
  - d) Hard
- 14)** A function palette is specific to the \_\_\_\_\_.
- a) Panel
  - b) Diagram
  - c) Graph
  - d) All of these

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Define the term Virtual Instrumentation.
- 2) Give basic structure of G program.
- 3) Draw block diagram of window.
- 4) Define array and clusters.
- 5) Mention any four tools for Virtual Instrumentation.

**B) Answer the following questions. (Any Four)** **06**

- 1) What do you mean by LABVIEW?
- 2) Write a note on case and sequence structures.
- 3) Explain local and global variables.

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Write a note on LAB VIEW window.
- 2) Explain string and file IO with suitable example.
- 3) Explain virtual Instrumentation programming techniques.

**B) Answer the following questions. (Any One) 06**

- 1) Explain difference between virtual instrumentation and traditional instrumentation.
- 2) Write a note on data flow techniques.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) What is need of IDE for development of virtual instrumentation system?
- 2) Explain graphical programming in data flow.
- 3) Explain terminals and nodes.

**B) Answer the following questions. (Any One)** **04**

- 1) What are the advantages of virtual instrumentation?
- 2) Explain functions and wires.

**Q.5 Answer the following questions. (Any Two)** **14**

- Explain architecture of virtual instrumentation.
- Explain in brief “G” programming language.
- Explain standard tools for virtual instrumentation.

**Seat  
No.**

## Max. Marks: 70

Page 1 of 2

- 11) The height of geostationary satellite is about \_\_\_\_\_ km.

|          |          |
|----------|----------|
| a) 3600  | b) 10000 |
| c) 36000 | d) 360   |
- 12) Fiber optic communication is based on the principle of \_\_\_\_\_.

|                              |                 |
|------------------------------|-----------------|
| a) Reflection                | b) Refraction   |
| c) Total internal reflection | d) Polarization |
- 13) Microwaves are the frequencies above \_\_\_\_\_.

|           |          |
|-----------|----------|
| a) 100Kz  | b) 1 MHz |
| c) 10 MHz | d) 1 GHz |
- 14) QAM uses \_\_\_\_\_.

|       |                   |
|-------|-------------------|
| a) AM | b) FM             |
| c) PM | d) Both AM and FM |

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) Define bit rate and baud rate.
- 2) What is geostationary satellite?
- 3) Give the advantages of microwave communication.
- 4) What is step index and graded index fiber?
- 5) What is wave guide?

**B) Write short notes. (Any Two)** **06**

- 1) Explain in brief the applications of satellite communication.
- 2) What is LAN, MAN and WAN?
- 3) Write a note on cavity resonator.

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) Explain the working of frequency synthesizer in cellular phone.
- 2) Write a note on Gunn diode.
- 3) Explain the working of satellite transponder.

**B) Answer the following question. (Any One)** **06**

- 1) Explain star, ring and bus network topologies.
- 2) Explain the operational procedure in a mobile telephone call.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) What are different light sources in optical communication? Explain the working of laser diode.
- 2) Explain the working of Klystron tube.
- 3) Explain the block diagram of cellular receiver.

**B) Answer the following question. (Any One)** **04**

- 1) Explain optical transmitter using LED.
- 2) Write a note on QPSK modulator.

**Q.5 Answer the following questions. (Any Two)** **14**

- Explain fiber optic communication system using block diagram.
- What is radar? Explain pulsed radar system.
- Explain the block diagram of earth station in satellite communication.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

|            |          |
|------------|----------|
| <b>Set</b> | <b>P</b> |
|------------|----------|

**B.Sc. (Semester - VI) (Old) (CBCS) Examination: Oct/Nov-2022**  
**COMPUTER SCIENCE (Special Paper - XVI)**  
**Angular JS**

Day & Date: Wednesday, 08-02-2023  
 Time: 03:00 PM To 05:30 PM

Max. Marks: 70

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

**Q.1 Choose the correct alternatives from the options. 14**

- 1) AngularJS expressions are written using \_\_\_\_\_.  
 a) (expression)                      b) {{expression}}  
 c) {{{expression}}}                d) [expression]
- 2) SPA is nothing but \_\_\_\_\_.  
 a) Some Page App                      b) Single Page Application  
 c) Similar Page Application        d) Server Page App
- 3) \_\_\_\_\_ Angular directive is used to binds the value of HTML controls like input, select, textarea to application data.  
 a) ng-model                              b) ng-bind  
 c) ng-connect                          d) ng-show
- 4) MVC is composed of \_\_\_\_\_ components.  
 a) Member Vertical Controller        b) Model View Control  
 c) Model View Controller            d) Model Variable Centered
- 5) \_\_\_\_\_ of the followings is/are validation directives.  
 a) ng-minlength                        b) ng-required  
 c) ng-pattern                            d) all of these
- 6) Scope act as interconnection between controller and view. \_\_\_\_\_.  
 a) True                                    b) False
- 7) Modules can be applied as \_\_\_\_\_.  
 a) Attribute                              b) Elements  
 c) Comments                            d) All of these
- 8) Using a \_\_\_\_\_, you could able to make an image increases in size when a user mouse over it.  
 a) Transform                              b) Transition  
 c) controller                              d) None of These
- 9) Controller in MVC is/are \_\_\_\_\_.  
 a) It is a software Code that stores the data  
 b) It is a software Code that renders the user interface  
 c) It is a software Code that controls the interactions between the Model and View  
 d) None of the above
- 10) Angular JS filters are useful for \_\_\_\_\_.  
 a) Sort Date                              b) Clean Data  
 c) Format Data                            d) None of these

- 11) \_\_\_\_\_ attribute tells AngularJS what part of our HTML page contains the AngularJS app.

|           |           |
|-----------|-----------|
| a) ag-app | b) js-app |
| c) aj-app | d) ng-app |
- 12) AngularJS applications can run on Android and iOS based phones/tablets.

|         |          |
|---------|----------|
| a) True | b) False |
|---------|----------|
- 13) With the \$routeProvider function, we are able to configure the routing mechanism of our application. This can be done by adding each route through the \_\_\_\_\_ function.

|               |              |
|---------------|--------------|
| a) when       | b) navigate  |
| c) controller | d) transform |
- 14) HTML page have multiple "ng-app" directive for bootstrapping multiple AngularJS application.

|         |          |
|---------|----------|
| a) True | b) False |
|---------|----------|

**Q.2 A) Answer the following questions. (Any Four)** **08**

- 1) What is use of ng-class directive? Explain with example.
- 2) What is difference between ng-Disable and ng-readonly directive?
- 3) Explain Creation and use of model with example.
- 4) Explain Object Expressions in AngularJS.
- 5) Why Angular JS is important?

**B) Answer the following questions. (Any Two)** **06**

- 1) Explain Bootstrapping in AngularJS with example.
- 2) Explain lowercase and uppercase filter with example.
- 3) What is Dependency Injection? Explain in detail.

**Q.3 A) Answer the following questions. (Any Two)** **08**

- 1) What is validation? Explain different validation properties and classes with example.
- 2) Explain ng-repeat directive's built in variables with example.
- 3) Explain how to use Multiple Controllers in AngularJS. Give example.

**B) Answer the following questions. (Any One)** **06**

- 1) What is use of filter? Explain order by, json and limitTo with example.
- 2) Explain single page application. Explain its advantages and disadvantages.

**Q.4 A) Answer the following questions (Any Two) 10**

- 1) What is custom filter? How to create it? Write custom filter for word counting.
- 2) What is scope? Explain Scope Hierarchies in detail.
- 3) Explain different ways of data binding with example.

**B) Answer the following questions. (Any One)** **04**

- 1) Explain Scope Life Cycle in detail.
- 2) Write code for validate student information using built-in validation.

**Q.5 Answer the following questions. (Any Two) 14**

- What is ng-anima be model? Explain transition and keyframe based animation with example.
- Explain AngularJS Archilecture in detail.
- What is routing? Explain different attribute used in when function with example.

11/11/2016



- 13)** Which option of ls command used to view hidden file?  
 a) -i                                      b) -d  
 c) -r                                      d) -a
- 14)** \_\_\_\_\_ symbol matches only a single character in file.  
 a) ?                                          b) \*  
 c) -                                          d) None of these

**Q.2 A) Answer the following questions. (Any Four) 08**

- 1) What is kernel?
- 2) What is the hardware requirement of Linux?
- 3) What is boot block?
- 4) What is NFS?
- 5) Write short note DHCP.

**B) Write short notes. (Any Two)** **06**

- 1) What is the role of system administrator?
- 2) Explain wc command with example.
- 3) How to create group? Explain with example.

**Q.3 A) Answer the following questions. (Any Two) 08**

- 1) What are the features of Linux operating system?
- 2) Which are the directory related command? Explain with example.
- 3) What is boot loader? Explain its types.

**B) Answer the following questions. (Any One)** **06**

- 1) What is ls command with its different options?
- 2) Write a shell script to check entered number is even or odd.

**Q.4 A) Answer the following questions. (Any Two) 10**

- 1) Explain hierarchy of file system.
- 2) Explain filter command with example.
- 3) Explain file operation commands with example.

**B) Answer the following questions. (Any One)** **04**

- 1) What is redirection? Explain I/O redirection.
- 2) Explain the architecture of Linux operating system.

**Q.5 Answer the following questions. (Any Two)** **14**

- Explain Vi editor in detail.
- How to archive and compression of the file in Linux.
- Write a Shell program to check the given integer is Prime or not.

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Monday, 06-02-2023  
Time: 12:00 PM To 01:00 PM

**सूचना :** 1) सर्व प्रश्न अनिवार्य आहेत.  
2) उजवीकडील अंक पूर्ण गुण दर्शवितात.

- Page 1 of 2

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

Day & Date: Monday, 06-02-2023  
Time: 12:00 PM To 01:00 PM

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

- 1) The supreme Commander of Indian Army is \_\_\_\_.

|                   |                   |
|-------------------|-------------------|
| a) The President  | b) Prime Minister |
| c) Vice President | d) None of these  |
- 2) N.C.C. came into existence in \_\_\_\_.

|         |         |
|---------|---------|
| a) 1948 | b) 1949 |
| c) 1950 | d) 1947 |
- 3) Tree plantation is a part of \_\_\_\_.

|                   |                    |
|-------------------|--------------------|
| a) Drill          | b) Weapon Training |
| c) Social Service | d) None of these   |
- 4) Poverty is a \_\_\_\_\_ problem.

|              |               |
|--------------|---------------|
| a) Financial | b) Industrial |
| c) Economic  | d) Social     |

- 1) Write down the full forms of RDC and TSC.
- 2) Write down the different religions in India.
- 3) Write down the factors affecting on national integration.

**OR**

Describe the duties and right of an ideal citizen.

Page 2 of 2

## Max. Marks: 50

## Answer

11

11

11

11

11

8. आदिवासी रोजंदारीवरील कामगार, मच्छिमार, बांधकाम मजूर यांचा समावेश भारताच्या ——— समूहांमध्ये होतो.

अ) पुढारलेल्या

ब) वंचित

क) सत्ताधारी

ड) यापैकी सर्व

☐

9. प्रातिनिधिक लोकशाहीत ——— प्रक्रिया शासन आणि जनतेला जोडते.

अ) भ्रष्टाचार

ब) हुकूमशाही

क) निवडणूक

ड) अर्थशास्त्र

☐

10. प्रत्यक्ष लोकशाही इसवी सन पूर्व तिसऱ्या शतकात ——— येथे सुरु झाली.

अ) भारत

ब) इंग्लंड

क) अथेन्स

ड) अमेरिकेची संयुक्त संस्थाने

☐

11. खालीलपैकी कोणता अधिकार भारतीय राज्यघटनेमधील मूलभूत अधिकार आहे?

अ) शिक्षणाचा अधिकार

ब) संप करण्याचा अधिकार

क) संपत्तीचा अधिकार

ड) क्रांती करण्याचा अधिकार

☐

12. ——— ही तळपातळीवरील संसदेची छोटी प्रतिकृती आहे.

अ) लोकसभा

ब) विधानपरिषद

क) ग्रामसभा

ड) राज्यसभा

☐

13. सुशासनासाठी ——— हे आवश्यक आहे.

अ) केंद्रीकरण

ब) खाजगीकरण

क) लोकसहभाग

ड) दंगा नियंत्रक पोलीस

☐

14. भारतीय मतदार ——— सदस्य प्रत्यक्षपणे निवडतात.

अ) राज्यसभेचे

ब) लोकसभेचे

क) विधान परिषदेचे

ड) निवडणूक आयोगाचे

☐

15. 73 वी आणि 74 वी घटना दुरुस्ती ——— सरकारशी संबंधित आहेत.

अ) केंद्र

ब) राष्ट्रीय

क) राज्य

ड) स्थानिक

☐

16. लोकशाहीला घटनात्मक शासन असेही म्हटले जाते, याचा अर्थ ——— राज्य असा होतो.

अ) शक्तीचे

ब) कायद्याचे

क) सत्ताधारी शक्तीच्या लहरीप्रमाणे

ड) हुकूमशहाचे

☐

17. सार्वजनिक उत्तरदायित्व म्हणजे प्रातिनिधीने लोकांना ——— असणे होय.

अ) विरोधी

ब) बेजबाबदार

क) जबाबदार

ड) यापैकी सर्व

☐

18. स्वातंत्र्य, समता आणि बंधुता ही ——— लोकशाहीची मुख्य मूल्ये आहेत.

अ) जुन्या

ब) ग्रीक

क) सामाजिक

ड) परदेशी

☐

19. ज्या राजकीय प्रक्रियेद्वारे केंद्र सरकारकडून स्थानिक सरकारकडे प्रशासकीय अधिकार आणि जबाबदाऱ्या हस्तांतरित केल्या जातात त्याला ——— असे म्हणतात.  
 अ) विकेंद्रिकरण ब) केंद्रीकरण  
 क) हुकूमशाही ड) हस्तक्षेप
20. राजकारणाने गुन्हेगारीकरण हे भारतीय लोकशाहीपुढील मुख्य ——— आहे.  
 अ) गरज ब) आव्हान  
 क) पात्रता ड) देणगी
21. भारतात राजकीय सहभागाच्या संधी ——— मर्यादित असतात.  
 अ) महिलांना ब) नेत्यांना  
 क) श्रीमंत लोकांना ड) यापैकी नाही
22. लोकसभेत ——— सदस्य आहेत आणि ते प्रत्यक्ष पद्धतीने निवडले जातात.  
 अ) 555 ब) 250  
 क) 288 ड) 543
23. सोलापूर शहर हे ——— कार्यक्षेत्रात येते.  
 अ) महानगरपालिकेच्या ब) ग्रामपंचायतीच्या  
 क) नगरपरिषदेच्या ड) पंचायत समितीच्या
24. भारतातील स्थानिक स्वराज्य संस्थांमधील एक तृतीयांश जागा ——— राखीव असतात.  
 अ) महिलांसाठी ब) मच्छिमारांसाठी  
 क) स्थलांतरित मजुरांसाठी ड) बांधकाम मजुरांसाठी
25. महाराष्ट्र विधानसभेत ——— सदस्य निवडून येतात.  
 अ) 75 ब) 200  
 क) 288 ड) 388
26. भारतातील शासन पद्धतीमध्ये ——— स्तर आहेत.  
 अ) चार ब) तीन  
 क) दोन ड) पाच
27. उत्तरदायित्व आणि पारदर्शकता ही दोन तत्वे ——— याच्याशी संबंधित आहेत.  
 अ) वॉर्ड शासन ब) जुने शासन  
 क) झुंडशाही ड) सुशासन
28. भारतीय नागरिकांना माहितीच्या अधिकाराद्वारे ——— माहिती मागविता येते.  
 अ) खाजगी कंपन्यांकडून ब) सरकारी अधिकाऱ्यांकडून  
 क) बहुराष्ट्रीय कंपन्यांकडून ड) यापैकी सर्व
29. शिक्षणाच्या अधिकाराद्वारे राजसंस्थेने ——— या वयोगटातील बालकांना शाळेत नाव नोंदविले आहे याची खात्री करून घेणे आवश्यक बनले आहे.  
 अ) 6 ते 14 ब) 1 ते 5  
 क) 15 ते 20 ड) यापैकी नाही

30. महात्मा गांधी राष्ट्रीय ग्रामीण रोजगार योजना म्हणजे ——— कायद्यातील तरतुदींची अंमलबजावणी करण्यातील एक पाऊल आहे.  
 अ) माहितीचा अधिकार ब) शिक्षण  
 क) रोजगार ड) स्वातंत्र्य

31. महाराष्ट्रातील ——— सदस्य प्रत्यक्ष लोकांकडून निवडले जातात.  
 अ) विधानसभा ब) राज्यसभा  
 क) विधानपरिषद ड) ग्रामसभा

32. ——— हे ग्रामीण स्थानिक स्वराज्य संस्थेचे उदाहरण आहे.  
 अ) ग्रामपंचायत ब) पंचायत समिती  
 क) जिल्हा परिषद ड) यापैकी सर्व

33. खेड्यातील ग्रामसभेमध्ये ——— समाविष्ट असतात.  
 अ) सर्व नोंदणीकृत मतदार ब) सर्व लोक  
 क) फक्त पुरुष मतदार ड) फक्त महिला मतदार

34. समाजातील सर्व सदस्यांचा ——— हे सुशासनाचे मूलभूत वैशिष्ट्य आहे.  
 अ) असमान सहभाग ब) हिंस्त्र सहभाग  
 क) समान सहभाग ड) यापैकी नाही

35. भारतात माहितीचा अधिकार हा कायदा ——— यावर्षी मंजूर झाला.  
 अ) 2005 ब) 1947  
 क) 1950 ड) 2020

36. खालीलपैकी कोणता अधिकार भारतात मूलभूत अधिकार नाही?  
 अ) स्वातंत्र्याचा अधिकार ब) संपत्तीचा अधिकार  
 क) समतेचा अधिकार ड) धार्मिक स्वातंत्र्याचा अधिकार

37. ——— यांच्या मते लोकशाही म्हणजे लोकांचेच, लोकांनी केलेले, लोकांसाठी राज्य होय.  
 अ) जॉन वूड ब) अब्राहम लिंकन  
 क) मदर तेरेसा ड) डोनाल्ड ट्रम्प

38. ——— लोकशाहीमध्ये नागरिक राज्यसंस्थेच्या कारभारात थेट सहभागी होत होते आणि नगर राज्यांच्या शासनात त्यांना अधिकार होता.  
 अ) अप्रत्यक्ष ब) प्रत्यक्ष  
 क) भारतीय ड) यापैकी नाही

39. डेमोक्रेसी (लोकशाही) हा इंग्लिश शब्द डिमॉस आणि क्रॅटोस या ग्रीक शब्दांपासून तयार झाला. डिमॉस म्हणजे ——— आणि क्रॅटोस म्हणजे ——— होय.  
 अ) लोक आणि राज्य ब) प्राणी आणि देव  
 क) देव आणि संत ड) यापैकी नाही

40. सार्वजनिक कल्याण आणि पुनर्वाटप तसेच सामाजिक असमानता कमी करण्याचे उद्देश असलेली पद्धत म्हणजेच ——— होय.  
 अ) नोकरशाही ब) महाजनशाही  
 क) लोकशाही ड) तंत्रशाही

41. प्रत्यक्ष लोकशाहीलाच ——— लोकशाही असेही म्हणतात.  
 अ) सहभागी ब) प्रातिनिधीक  
 क) नवीन ड) नकारात्मक ☐
42. लोकशाहीमध्ये विधिमंडळ, मंत्रिमंडळ आणि इतर समितीमधील प्रश्न सोडविण्यासाठी ——— हे तत्व वापरतात.  
 अ) अल्पमताचे नियम ब) बहुमताचा नियम  
 क) नेतृत्व ड) हुकूमशाही ☐
43. डॉ.आंबेडकर यांनी ——— लोकशाहीचा पुरस्कार केला.  
 अ) प्रत्यक्ष ब) सामाजिक  
 क) प्राचीन ड) आधुनिक ☐
44. महाराष्ट्र गांधी राष्ट्रीय ग्रामीण रोजगार हमी कायदा हे ——— योजनेचे उदाहरण आहे.  
 अ) राजकीय ब) सामाजिक कल्याण  
 क) लोकप्रिय ड) निवडणूक ☐
45. खालीलपैकी कोणते लोकशाहीचे तत्व नाही?  
 अ) सहमतीने शासन ब) सार्वजनिक उत्तरदायित्व  
 क) कायद्याचे राज्य ड) हुकूमशाही ☐
46. भारतात खुल्या आणि न्यायपूर्ण निवडणूक सातत्याने घेतल्या गेल्या. याला ——— हे वर्ष अपवाद होते.  
 अ) 2014  
 ब) 1976  
 क) 1967  
 ड) 2000 ☐
47. बलवंतराय मेहता आणि अशोक मेहता समिती या भारतातील ——— या घटकाशी संबंधित आहेत.  
 अ) जी.एस.टी ब) संसद  
 क) राज्य सरकार ड) पंचायती राज्य संस्था ☐
48. अर्थशास्त्र या प्राचीन भारतीय ग्रंथात सुशासनाची तत्वे सांगितली आहेत. अर्थशास्त्राचा लेखक कोण?  
 अ) रामचंद्रन ब) कौटिल्य  
 क) मंडन मिश्र ड) कालिदास ☐
49. स्वातंत्र्य, समता आणि बंधुता हा ——— राज्यक्रांतीचा नारा होता.  
 अ) इंडोनेशियन ब) फ्रेंच  
 क) अमेरिकन ड) रशियन ☐
50. ——— हे अधिकार पारदर्शकता आणि उत्तरदायित्वाचे उदाहरण आहे.  
 अ) माहितीचा ब) संपत्तीचा  
 क) एकत्र येण्याचा ड) धार्मिक ☐



Day & Date: Sunday, 12-02-2023  
Time: 12:00 PM to 02:00 PM

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

**Q.1 Choose the correct option and rewrite the sentence.**

- 10

11

7

11

11

7

- 9) In representative democracy the process of \_\_\_\_\_ links the government and the people.
- |               |                 |                          |
|---------------|-----------------|--------------------------|
| a) corruption | b) dictatorship | <input type="checkbox"/> |
| c) election   | d) economics    |                          |
- 10) Direct democracy was started in \_\_\_\_\_ in 3<sup>rd</sup> century B.C.
- |           |            |                          |
|-----------|------------|--------------------------|
| a) India  | b) England | <input type="checkbox"/> |
| c) Athens | d) U.S.A.  |                          |
- 11) Which one of the following is the fundamental right in Indian constitution?
- |                       |                    |                          |
|-----------------------|--------------------|--------------------------|
| a) Right to Education | b) Right to Strike | <input type="checkbox"/> |
| c) Right to Property  | d) Right to Revolt |                          |
- 12) \_\_\_\_\_ is miniature of the Parliament of India at the grassroots level.
- |              |                   |                          |
|--------------|-------------------|--------------------------|
| a) Loksabha  | b) Vidhanparishad | <input type="checkbox"/> |
| c) Gramsabha | d) Rajysabha      |                          |
- 13) \_\_\_\_\_ is necessary for the good governance.
- |                         |                        |                          |
|-------------------------|------------------------|--------------------------|
| a) Centralization       | b) Privatization       | <input type="checkbox"/> |
| c) Public Participation | d) Riot Control Police |                          |
- 14) Indian voters directly elect the members of \_\_\_\_\_
- |                    |                        |                          |
|--------------------|------------------------|--------------------------|
| a) Rajysabha       | b) Loksabha            | <input type="checkbox"/> |
| c) Vidhan Parishad | d) Election Commission |                          |
- 15) The 73<sup>th</sup> and 74<sup>th</sup> constitutional amendments are related to the \_\_\_\_\_ government.
- |            |             |                          |
|------------|-------------|--------------------------|
| a) central | b) national | <input type="checkbox"/> |
| c) state   | d) local    |                          |
- 16) Democracy is also considered as the constitutional government which means government by \_\_\_\_\_ rather than by men.
- |                                   |             |                          |
|-----------------------------------|-------------|--------------------------|
| a) force                          | b) law      | <input type="checkbox"/> |
| c) whims and fancies of the ruler | d) dictator |                          |
- 17) Public Accountability means the representative must remain \_\_\_\_\_ to the people
- |               |                  |                          |
|---------------|------------------|--------------------------|
| a) opposite   | b) irresponsible | <input type="checkbox"/> |
| c) answerable | d) all of these  |                          |
- 18) Freedom, equality and fraternity are the core values of \_\_\_\_\_ democracy.
- |           |            |                          |
|-----------|------------|--------------------------|
| a) Old    | b) Greek   | <input type="checkbox"/> |
| c) Social | d) Foreign |                          |
- 19) The political process by which the administrative authority and responsibilities are transferred from central government to the local government is known as \_\_\_\_\_
- |                     |                          |
|---------------------|--------------------------|
| a) Decentralization | <input type="checkbox"/> |
| b) Centralization   |                          |
| c) Dictatorship     |                          |
| d) Interference     |                          |
- 20) Criminalization of politics is the basic \_\_\_\_\_ before the democracy in India.
- |                  |              |                          |
|------------------|--------------|--------------------------|
| a) need          | b) challenge | <input type="checkbox"/> |
| c) qualification | d) boon      |                          |

- 21) The opportunities for political participation are minimal to \_\_\_\_\_ in India
- |                |                  |                          |
|----------------|------------------|--------------------------|
| a) women       | b) leaders       | <input type="checkbox"/> |
| c) rich people | d) none of these |                          |
- 22) Loksabha has \_\_\_\_\_ members which are directly elected by the people.
- |        |        |                          |
|--------|--------|--------------------------|
| a) 555 | b) 250 | <input type="checkbox"/> |
| c) 288 | d) 543 |                          |
- 23) Solapur city comes under the jurisdiction of \_\_\_\_\_.
- |                          |                      |                          |
|--------------------------|----------------------|--------------------------|
| a) Municipal Corporation | b) Village Panchayat | <input type="checkbox"/> |
| c) Municipal Council     | d) Panchayat Samiti  |                          |
- 24) In the local governments of India one third of the seats are reserved for \_\_\_\_\_.
- |                     |                         |                          |
|---------------------|-------------------------|--------------------------|
| a) women            | b) fisher folks         | <input type="checkbox"/> |
| c) migrated workers | d) construction workers |                          |
- 25) There are \_\_\_\_\_ elected members in Maharashtra Vidhansabha.
- |        |        |                          |
|--------|--------|--------------------------|
| a) 75  | b) 200 | <input type="checkbox"/> |
| c) 288 | d) 388 |                          |
- 26) There are \_\_\_\_\_ tiers of Indian government.
- |         |          |                          |
|---------|----------|--------------------------|
| a) Four | b) Three | <input type="checkbox"/> |
| c) Two  | d) Five  |                          |
- 27) The principles of accountability and transparency are related to the \_\_\_\_\_.
- |                   |                    |                          |
|-------------------|--------------------|--------------------------|
| a) bad governance | b) old governance  | <input type="checkbox"/> |
| c) mobocracy      | d) good governance |                          |
- 28) Indians can seek information from \_\_\_\_\_ under the Right to Information Act.
- |                            |                         |                          |
|----------------------------|-------------------------|--------------------------|
| a) private companies       | b) government officials | <input type="checkbox"/> |
| c) multinational companies | d) all of these         |                          |
- 29) The Right to Education makes it mandatory for the state to ensure that all children of the \_\_\_\_\_ age group enroll themselves in schools.
- |             |                  |                          |
|-------------|------------------|--------------------------|
| a) 6 to 14  | b) 1 to 5        | <input type="checkbox"/> |
| c) 15 to 20 | d) none of these |                          |
- 30) Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) is one step towards implementing the provision of \_\_\_\_\_
- |                         |                       |                          |
|-------------------------|-----------------------|--------------------------|
| a) Right to Information | b) Right to Education | <input type="checkbox"/> |
| c) Right to Work        | d) Right to Liberty   |                          |
- 31) The members of Maharashtra \_\_\_\_\_ are directly elected by the people.
- |                    |              |                          |
|--------------------|--------------|--------------------------|
| a) Vidhansabha     | b) Rajysabha | <input type="checkbox"/> |
| c) Vidhan Parishad | d) Gramsabha |                          |
- 32) \_\_\_\_\_ is the example of rural local self government.
- |                      |                     |                          |
|----------------------|---------------------|--------------------------|
| a) Village Panchayat | b) Panchayat Samiti | <input type="checkbox"/> |
| c) Zilla Parishad    | d) All of these     |                          |
- 33) Gram Sabha comprised of \_\_\_\_\_ in the village.
- |                              |                       |                          |
|------------------------------|-----------------------|--------------------------|
| a) all the registered voters | b) all the people     | <input type="checkbox"/> |
| c) only male voters          | d) only female voters |                          |

- 34) \_\_\_\_\_ by all the members of society is the basic feature of good governance.
- |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| a) Unequal participation | b) violent participation | <input type="checkbox"/> |
| c) Equal participation   | d) none of these         |                          |
- 35) The Right to Information was passed in India in the year \_\_\_\_\_.
- |         |         |                          |
|---------|---------|--------------------------|
| a) 2005 | b) 1947 | <input type="checkbox"/> |
| c) 1950 | d) 2020 |                          |
- 36) Which of the following is not the fundamental right?
- |                                 |                          |
|---------------------------------|--------------------------|
| a) Right to Freedom             | <input type="checkbox"/> |
| b) Right to Property            |                          |
| c) Right to Equality            |                          |
| d) Right to Freedom of Religion |                          |
- 37) According to \_\_\_\_\_ Democracy is government of the people, by the people and for the people
- |                  |                   |                          |
|------------------|-------------------|--------------------------|
| a) John Wood     | b) Abraham Lincon | <input type="checkbox"/> |
| c) Mother Teresa | d) Donald Trump   |                          |
- 38) In \_\_\_\_\_ democracy, citizens participated in the affairs of the state directly and had a say in the governance of the city state
- |             |                  |                          |
|-------------|------------------|--------------------------|
| a) Indirect | b) Direct        | <input type="checkbox"/> |
| c) Indian   | d) none of these |                          |
- 39) The word democracy is derived from the Greek words Demos and Kratos. The meaning of Demos is \_\_\_\_\_ and Kratos means \_\_\_\_\_.
- |                    |                   |                          |
|--------------------|-------------------|--------------------------|
| a) people and rule | b) animal and God | <input type="checkbox"/> |
| c) God and Saints  | d) none of these  |                          |
- 40) A system of welfare and redistribution aimed to narrow social inequalities is called \_\_\_\_\_.
- |                |                |                          |
|----------------|----------------|--------------------------|
| a) Bureaucracy | b) Aristocracy | <input type="checkbox"/> |
| c) Democracy   | d) Technocracy |                          |
- 41) Direct democracy is also known as \_\_\_\_\_ democracy.
- |                  |                   |                          |
|------------------|-------------------|--------------------------|
| a) Participatory | b) Representative | <input type="checkbox"/> |
| c) New           | d) Negative       |                          |
- 42) In democracy all issues in legislature, cabinet, executive and other committees are resolved through the principle of \_\_\_\_\_.
- |                  |                  |                          |
|------------------|------------------|--------------------------|
| a) minority rule | b) majority rule | <input type="checkbox"/> |
| c) leadership    | d) dictatorship  |                          |
- 43) Dr. Babasaheb Ambedkar strongly advocated \_\_\_\_\_ democracy.
- |            |           |                          |
|------------|-----------|--------------------------|
| a) Direct  | b) Social | <input type="checkbox"/> |
| c) Ancient | d) Modern |                          |
- 44) The Mahatma Gandhi National Rural Employment Guarantee Act is the example of the largest \_\_\_\_\_ scheme of its kind in the world.
- |              |                   |                          |
|--------------|-------------------|--------------------------|
| a) political | b) social welfare | <input type="checkbox"/> |
| c) populist  | d) election       |                          |
- 45) Which among the following is not the principle of democracy?
- |                          |                          |                          |
|--------------------------|--------------------------|--------------------------|
| a) Government by consent | b) Public Accountability | <input type="checkbox"/> |
| c) Rule of Law           | d) Dictatorship          |                          |

- 46)** The free and fair elections were conducted, at regular interval, in India except in \_\_\_\_\_.  
a) 2014  
b) 1976  
c) 1967  
d) 2000

☐

- 47)** Balwantrai Mehta and Ashok Mehta committee are related to \_\_\_\_\_ in India.  
a) G.S.T.  
b) Parliament  
c) State Governments  
d) Panchayati Raj institutions

☐

- 48)** The ancient Indian book Arthshastra highlighted the principle of Good Governace. Who is the author of Arthshashtra?  
a) Ramchandran  
b) Kautilya  
c) Mandan Mishr  
d) Kalidas

☐

- 49)** "Freedom, Equality and Fraternity" was the battlecry of the \_\_\_\_\_ revolution.  
a) Indonesian  
b) French  
c) American  
d) Russian

☐

- 50)** The Right to \_\_\_\_\_ is the example of transparency and accountability.  
a) Information  
b) Property  
c) Assembly  
d) Religion

☐

|                 |  |
|-----------------|--|
| <b>Seat No.</b> |  |
|-----------------|--|

- प्र.2 खालीलपैकी कोणत्याही चार प्रश्नांची थोडक्यात उत्तरे लिहा. 08
- पर्यावरण अभ्यासाची व्याख्या लिहा.
  - वाळवंटी परिसंस्थेतील जैविक घटक
  - नैसर्गिक साधनसंपत्तीचे प्रकार लिहा.
  - जैवविविधता संवर्धनाचे प्रकार लिहा.
  - वायु प्रदूषणाचे कारणे लिहा.
  - ओझोन क्षयाची कारणे लिहा.
- प्र.3 खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. 08
- पर्यावरण अभ्यासाचे महत्त्व लिहा.
  - परिसंस्थेतील ऊर्जाप्रवाह
  - पूराची कारणे लिहा.
- प्र.4 खालीलपैकी कोणत्याही दोन प्रश्नांची उत्तरे लिहा. 08
- जल प्रदूषणाची कारणे व परिणाम स्पष्ट करा.
  - जैवविविधता म्हणजे काय? जैवविविधता प्रकाराचे वर्णन स्पष्ट करा.
  - वन्यजीव संरक्षण कायदा स्पष्ट करा.
- प्र.5 खालीलपैकी कोणत्याही एका प्रश्नाचे उत्तर लिहा. 08
- पर्यावरण अभ्यासाचे स्वरूप व व्याप्ती स्पष्ट करा.
- किंवा
- लोकसंख्या वाढीचा पर्यावरणावर होणारा परिणाम स्पष्ट करा.

|          |  |
|----------|--|
| Seat No. |  |
|----------|--|

Set **P**

**B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2022**  
**Environmental Studies**

Day & Date: Sunday, 12-02-2023  
 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 alternatives from the options.** **08**

- 1) The word 'Environment' is derived from \_\_\_\_\_ language.
  - a) French
  - b) Roman
  - c) Latin
  - d) Greek
- 2) First World Environmental conference was held at \_\_\_\_\_.
  - a) Mumbai
  - b) Stockholm
  - c) London
  - d) Tokyo
- 3) Sahara is a example of \_\_\_\_\_ ecosystem.
  - a) Marine
  - b) Grassland
  - c) Forest
  - d) Desert
- 4) The primary source of energy is \_\_\_\_\_.
  - a) Hydal energy
  - b) Tidal
  - c) Sun
  - d) Wind
- 5) The 'Wildlife Protection Act' was passed in the year \_\_\_\_\_ in India.
  - a) 1971
  - b) 1972
  - c) 1974
  - d) 1976
- 6) Marine life is in danger due to \_\_\_\_\_ Pollution.
  - a) Land
  - b) Air
  - c) Water
  - d) Noise
- 7) In India \_\_\_\_\_ region is rich in biodiversity.
  - a) Western Himalaya – Aravali
  - b) Ajantha – Aravali
  - c) Eastern Himalaya -Western Ghat
  - d) Eastern Ghat – Koromandal
- 8) International Ozone Day is celebrated on \_\_\_\_\_ day.
  - a) 16<sup>th</sup> June
  - b) 16<sup>th</sup> July
  - c) 16<sup>th</sup> August
  - d) 16<sup>th</sup> September

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

- 1) Write a definition of environmental studies.
- 2) Biological components of desert ecosystems.
- 3) Write the types of natural resources.
- 4) Write the types of biodiversity conservation.
- 5) write the causes of air pollution.
- 6) Write the causes of ozone depletion.



- Q.3 Attempt any two of the following questions. 08**
- 1) Write the importance of environmental studies.
  - 2) Energy flow in the ecosystem
  - 3) Write down the reasons for the flood.
- Q.4 Attempt any two of the following questions. 08**
- 1) Explain the causes and effects of water pollution.
  - 2) What is biodiversity? Explain the type of biodiversity.
  - 3) Explain the Wildlife Conservation Act.
- Q.5 Attempt any one of the following questions. 08**
- 1) Explain the nature and scope of environmental studies.
  - 2) Explain the impact of population growth on the environment.