



- Q.2 Answer any four of the following.** **12**
- a) What tactics were used by Mahatma Gandhi for making Khadi popular?
  - b) How did Jadav Payeng begin his work at Maioli Island?
  - c) Describe the tragic end of Khushwant Singh's "The Portrait of a Lady".
  - d) How did Rabindranath Tagore want God to help him?
  - e) Describe the process which gave birth to the Lotus.
  - f) What is the symbolic meaning of the title "The Toys" of the poem by Coventry Patmore?
- Q.3 a)** Write a detailed note on the process of communication. **10**
- OR
- b)** What are the seven features of effective communication?
- Q.4** Define intrapersonal skills and write a detailed note on them. **10**



- Q.3 Write short notes on any two of the following** **08**
- a) Write a short note on second law of thermodynamics.
  - b) Mention four simple rules of integration.
  - c) Write short note on joule Thomson effect.
- Q.4 Answer any two of the following** **08**
- a) Explain deviation of real gases from Boyle's law
  - b) Explain efficiency of heat engine. Calculate the % efficiency of steam engine operating between 373k and 298k.
  - c) For a certain first order reaction the time for half change is 60 seconds. How much time will be required for the completion  $3/4^{\text{th}}$  reaction?
- Q.5 Answer any one of the following** **08**
- a) Explain in detail Andrew s isotherm for  $\text{CO}_2$  gas.
  - b) Define second order reaction and derive the rate constant equation for second order reaction with equal concentration.



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**B.Sc. (Semester – I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper - I)**  
**Fundamental of Computer (22221120)**

Day & Date: Wednesday, 19-07-2023  
 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 table and calculator is allowed.

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

- 1) Which of the following devices provides the communication between a computer and the outer world?
 

a) Compact	b) I/O
c) Drivers	d) Storage
- 2) Which of the following is the device used for converting maps, pictures, and drawings into digital form for storage in computers?
 

a) Image Scanner	b) Digitizer
c) MICR	d) Scanner
- 3) Secondary storage virtually has an unlimited capacity because the cost per bit is very low \_\_\_\_\_.
 

a) True	b) False
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- 4) The dots on the magnetic tape represent \_\_\_\_\_.
 

a) Binary digits	b) Decimal digits
c) Hex digits	d) Oct digits
- 5) Which of the following uses multiple hard disk platters mounted on a single central shaft?
 

a) Disk drives	b) Hard disks
c) Disk packs	d) Compact disks
- 6) The physical devices of a computer \_\_\_\_\_.
 

a) Software	b) Package
c) Hardware	d) System Software
- 7) Word processing software is a type of application software \_\_\_\_\_.
 

a) True	b) False
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- 8) Who is the father of Computers?
 

a) James Gosling	b) Charles Babbage
c) Dennis Ritchie	d) Bjarne Stroustrup

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

- a) What is Worksheet?
- b) What is Pseudo code?
- c) Define hardware and software.
- d) What is joysticks?
- e) Define algorithm.
- f) What is Secondary Storage?

- Q.3 Write short notes on any two of the following** **08**
- a) Compiler
  - b) CRT Monitor
  - c) Plotter
- Q.4 Answer any Two of the following.** **08**
- a) How to import and export data in Excel?
  - b) Explain block diagram of computer.
  - c) Explain the types of computer.
- Q.5 Answer any one of the following** **08**
- a) Define Programming Language. Explain types in detail.
  - b) What is Mail merge? How to create it? Explain all steps in details.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Paper – II)**  
**Inorganic Chemistry (22221107)**

Day & Date: Thursday, 20-07-2023  
 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.  
 (At. Wts.: H=1, C=12, O =16, N= 14, Na =23, Cl = 35.5)

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

- 1) The MOT has been developed by \_\_\_\_\_ in 1931.
  - a) Pauling and Slater
  - b) Huckel, Hund and Mullikan
  - c) K. Fajan
  - d) H. Bethe
- 2) According to MOT the oxygen molecule \_\_\_\_\_ in nature.
  - a) Unstable
  - b) Diamagnetic
  - c) Paramagnetic
  - d) Antiferromagnetic
- 3) The observed bond angle in H<sub>2</sub>O is 104.5° is due to presence of \_\_\_\_\_ lone pairs.
  - a) four
  - b) one
  - c) three
  - d) two
- 4) The geometry of Ammonia<sub>3</sub> molecule is \_\_\_\_\_.
  - a) tetrahedral
  - b) square planer
  - c) pentagonal bipyramidal
  - d) pyramidal
- 5) The limiting radius ratio for square planer geometry is \_\_\_\_\_.
  - a) >1.0000
  - b) 0.414-0.732
  - c) 155- 0.225
  - d) 0.732-1.000
- 6) In H<sub>3</sub>N:BF<sub>3</sub> adduct the two molecules are held together by \_\_\_\_\_ bond.
  - a) coordinate
  - b) covalent
  - c) ionic
  - d) metallic
- 7) Compared with other bonds \_\_\_\_\_ forces are very weak.
  - a) van der Walls
  - b) hydrogen bonding
  - c) metallic
  - d) ionic bonding
- 8) The size of anion is \_\_\_\_\_ its atomic size.
  - a) equal to
  - b) greater than
  - c) less than
  - d) None of these

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

- a) What is the trend of reactivity in the periodic table?
- b) Define hydrogen bonding with suitable example.
- c) Draw the MO diagram of Hydrogen molecule.
- d) What is the shape of PCl<sub>5</sub> molecule and what are the bond angle in it?
- e) Draw the unit cell structure of CsCl.

- Q.3 Write the short notes on any TWO.** **08**
- a) Shapes of 'd' orbitals.
  - b) Geometry of  $\text{BF}_3$  molecule.
  - c) Formation of ionic bond.
- Q.4 Answer any TWO of the following.** **08**
- a) Distinguish between atomic and molecular orbital.
  - b) Explain in brief, Born –Haber's cycle.
  - c) Discuss in brief, Hund's rule and Pauli's exclusion principle.
- Q.5 Answer any ONE of the following.** **08**
- a) Discuss in detail unit cell structure of rock salt.
  - b) Explain bond order, stability and magnetic property of nitrogen molecule  
molecular orbital theory.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper-II)**  
**Programming Using C (22221121)**

Day & Date: Thursday, 20-07-2023  
 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 table and calculator is allowed.

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ has fix value that never changes.
  - a) Operator
  - b) Variable
  - c) Constant
  - d) Keyword
- 2) \_\_\_\_\_ is the 'C' token.
  - a) Keyword
  - b) Variable
  - c) Operator
  - d) All of these
- 3) \_\_\_\_\_ is allowed in Scanf () function.
  - a) Format Code
  - b) Variable
  - c) &
  - d) All of these
- 4) 'C' language is \_\_\_\_\_ programming language.
  - a) High-level
  - b) Low-level
  - c) Middle-level
  - d) None of these
- 5) \_\_\_\_\_ is / are control structures in 'C' language.
  - a) For
  - b) While
  - c) Do-while
  - d) All of these
- 6) \_\_\_\_\_ is the only special symbol allowed in identifier.
  - a) -
  - b) @
  - c) \$
  - d) #
- 7) Which of the following is wrong related with identifier?
  - a) Should not be keyword.
  - b) Should consist from alphabets and digits.
  - c) Should start with digit.
  - d) White spaces are not allowed.

a I                      b II                      C III                      d IV
- 8) Which of the following is not type of logic?
  - a) Sequence logic
  - b) Selection logic
  - c) Iteration logic
  - d) Multiwey logic

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

**08**

- a) What is array?
- b) Define structure.
- c) What is self referential variables.
- d) Define local & global variables.
- e) Define pointer.
- f) What is identifier?

- Q.3** Write short notes on any two of the following. **08**
- a) Command line arguments.
  - b) Recursion.
  - c) File opening modes.
- Q.4** Answer any two of the following **08**
- a) Explain call by value and call by reference.
  - b) Write a program to delete any element from an array.
  - c) Explain nested structure.
- Q.5** Answer any one of the following. **08**
- a) Explain any four string handling functions with program.
  - b) Write a program to display addition of matrix.



- d) State any two factors affecting surface tension.
- e) Define viscosity of liquid.

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

- a) What is Bifilar Pendulum. Obtain expression for time period in bifilar pendulum.
- b) Poisson's ratio for a rubber tube is 0.35. When it is loaded at one end the change in volume is 1.8 cc and change in length is 1.1 cm. Calculate the area of cross section of the tube.
- c) Describe Jaeger's method to determine surface tension of the liquid.

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

- a) The excess pressure inside a soap bubble of radius 1 cm is balanced by oil column of 2mm. Find the surface tension of the soap solution if the density of oil is  $800 \text{ kg/m}^3$ .
- b) Show that shear strain is equivalent to compression and extension strain.
- c) Show that the center of suspension and center of oscillation of a compound pendulum are interchangeable.

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

- a) Derive an expression for moment of inertia of a spherical shell about one of its diameter.
- b) Obtain Poiseuille's equation to determine the coefficient of viscosity of liquid.





- Q.2 Answer Any Four of the Following. 08**
- a) Define Biogenesis?
  - b) Define Taxonomy?
  - c) Draw the four different shapes of Bacteria.
  - d) Describe in Short about the Work carried out in NIV.
  - e) Write in short the contribution of Alexander Fleming.
- Q.3 Write Short Notes on any two of the following. 08**
- a) Define Virus and Write in short about Phytophage, Zoophage and Bacteriophage with their examples.
  - b) Describe in short about the contribution of Martinus Beijerinck and Sergei Winogradsky.
  - c) Describe in short Germ theory of disease.
- Q.4 Answer Any Two of the following. 08**
- a) Describe in short about any four branches of Microbiology.
  - b) Describe in short about biochemical criteria for bacterial classification.
  - c) Describe in short about morphological characters of Fungi.
- Q.5 Answer Any one of the Following. 08**
- a) Describe in detail about contribution of Louis Pasteur and describe in short about swan neck flask experiment.
  - b) Describe in short about the morphological characters of Rickettsia, Mycoplasma, Algae and Actinomycetes.



- Q.2 Answer any FOUR of the following. 08**
- a) What are the different applications of Spectrometer?
  - b) For the interference pattern obtained in wedge shaped thin film, write the formula of fringe width.
  - c) What is population inversion in production of the Laser?
  - d) In Newton's Rings experiment, the wavelength of source of light  $6000\text{\AA}$  is used and the diameter of 15<sup>th</sup> dark ring 0.6 cm is noted. Calculate the radius of curvature of a Plano-convex lens.
  - e) Calculate the maximum order of diffraction for the plane transmission grating having 18000 lines per inch when wavelength incident light is  $6458\text{\AA}$ .
- Q.3 Write short notes on any TWO of the following. 08**
- a) Hyegen's Eye-piece
  - b) Spherical Aberration
  - c) Ruby Laser
- Q.4 Answer any ONE of the following. 08**
- a) By using the Fermat's Principle prove that an angle of incidence is equal to an angle of reflection.
  - b) Describe the Einstein's Coefficient of absorption of radiations and stimulated emission of radiations.
  - c) Calculate the focal length of Ramsden's Eye-piece and the position of cross-wires when the distance of separation between field and eye lens is 8 cm.
- Q.5 Answer any ONE of the following. 08**
- a) Derive the formula for the radius of n<sup>th</sup> Newton's Ring and describe the Newton's Rings experiment to determine the wavelength of monochromatic source of light.
  - b) Describe the procedure of construction of a plane diffraction grating and an experiment of a plane diffraction grating to determine wavelength of monochromatic source of light.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Paper – II)**  
**Cell cytology and Microbial Techniques (22221115)**

Day & Date: Saturday, 22-07-2023  
 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.

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

- 1) Lipopolysacchride is part of \_\_\_\_\_.  
 a) gram positive bacterial cell wall  
 b) gram negative bacterial cell wall  
 c) pili  
 d) endospore
- 2) A substance which increases affinity of stain for object is called \_\_\_\_\_.  
 a) Mordant  
 b) Stain  
 c) Chromophore  
 d) Auxochrome
- 3) The organs of motility in bacterial cell is \_\_\_\_\_.  
 a) pili  
 b) flagella  
 c) nucleoid  
 d) cell membrane
- 4) Primary stain used in gram staining is \_\_\_\_\_.  
 a) basicfuchsin  
 b) Haematoxylon  
 c) Crystal violet  
 d) Safranin
- 5) Bacterial ribosome is \_\_\_\_\_.  
 a) 80S  
 b) 70S  
 c) 60S  
 d) 40 S
- 6) In electron microscope, \_\_\_\_\_ is used as an objective lense.  
 a) Magnetic coils  
 b) Superfine glass  
 c) Aluminium foils  
 d) Electrons
- 7) \_\_\_\_\_ is the correct order of chemicals used in a gram staining procedure.  
 a) iodine, ethanol, crystal violet, safarnin  
 b) crystal violet, iodine, ethanol, safarnin  
 c) crystal violet, ethanol, idodine, safarnin  
 d) safarnin, ethanol, idodine, crystal violet
- 8) Three dimensional view of specimens are provided by \_\_\_\_\_ microscope  
 a) scanning electron  
 b) phase contrast  
 c) dark field  
 d) transmission electron

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

- 1) What is acidic stain? give examples.
- 2) Define resolving power of microscope.
- 3) Define sanitization
- 4) What is protoplast?
- 5) Give the functions of pili of bacteria

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

**08**

- a) Ultrastructure of endospore
- b) Sterilization by Phenol and phenolic compounds
- c) Cell wall staining

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

**08**

- a) Write in detail about fluid mosaic model.
- b) Discuss about Cell wall of Gram-positive bacteria.
- c) Principle, working and application of Transmission electron microscope (TEM).

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

**08**

- a) Write in detail on Structure, composition and Functions of flagella.
- b) Write essay on, Differential staining.

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**B.Sc. (Semester – I) (New) (CBCS) Examination: March/April-2023**  
**STATISTIC (Paper - I)**  
**Descriptive Statistics - I (22221108)**

Day & Date: Sunday, 23-07-2023  
 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) Use of logarithmic table and calculator is allowed.

**Q.1 Multiple choice questions:**

**08**

- 1) Age of person is \_\_\_\_\_.
  - a) An Attribute
  - b) A discrete variable
  - c) A continuous variable
  - d) None of these
- 2) The histogram of a frequency distribution cannot be drawn, if the classes are \_\_\_\_\_.
  - a) Of unequal width
  - b) Of open-end classes
  - c) Inclusive classes
  - d) None of these
- 3) Which is not suitable measure to calculate average speed of train?
  - a) AM
  - b) GM
  - c) HM
  - d) None of these
- 4) Median is equivalent to \_\_\_\_\_.
  - a)  $Q_2$
  - b)  $D_5$
  - c)  $P_{50}$
  - d) All the above
- 5) In case of consistent data, no class frequency can be \_\_\_\_\_.
  - a) Positive
  - b) Negative
  - c) Both (A) and (B)
  - d) Neither (A) and (B)
- 6) The range of group of numbers -10, -8, 1, 11, 19 is \_\_\_\_\_.
  - a) 1
  - b) 26
  - c) 24
  - d) 29
- 7) If 25% of the items are less than 30 and 25% are more than 70, the Q. D. is \_\_\_\_\_.
  - a) 20
  - b) 30
  - c) 70
  - d) 10
- 8) The second moment about mean is 16, the standard deviation will be \_\_\_\_\_.
  - a) 16
  - b) 4
  - c) 2
  - d) 0

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

**08**

- a) Define Class limits and midpoint.
- b) For two positive observations a and b show that  $G.M. = \sqrt{A.M. \times H.M.}$
- c) Define Range and coefficient of range.
- d) Define positive association and negative association.
- e) Define Bowley's coefficient of skewness and state its limits.

- Q.3 Write short notes on any two of the following** **08**
- a) Distinguish between inclusive and exclusive methods.
  - b) What is effect of change of origin and scale on central moments?
  - c) What is meant by consistency of data? State the conditions of consistency for one attribute A.
- Q.4 Answer any Two of the following.** **08**
- a) Show that sum of squares of deviation taken from mean is minimum.
  - b) Show that standard deviation is always greater than or equal to mean deviation about mean.
  - c) For any frequency distribution show that  $\beta_2 \geq 1$
- Q.5 Answer any one of the following** **08**
- a) Define mode and derive the formula for mode in case of continuous frequency distribution.
  - b) Obtain the first four central moments in terms of central moments.



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**B.Sc. (Semester – I) (New) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Paper - I)**  
**Animal Diversity I (22221122)**

Day & Date: Sunday, 23-07-2023  
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

**Q.1 Multiple choice questions:**

**08**

- 1) Which of the following locomotory organelle is present in Amoeba?
  - a) Cilia
  - b) Pseudopodia
  - c) Flagellum
  - d) Tentacles
- 2) Sycon belong to which of the following class \_\_\_\_\_.
  - a) Calcarea
  - b) Hexactinellida
  - c) Demonspongia
  - d) Crustacea
- 3) Division of labour between the several individual is known as \_\_\_\_\_.
  - a) Vital activity
  - b) Labour division
  - c) Polymorphism
  - d) Polyfunctions
- 4) Tapeworm belong to which of the following phylum \_\_\_\_\_.
  - a) Porifera
  - b) Cnidaria
  - c) Platyhelminthes
  - d) Nemathelminthes
- 5) Metameric segmentation is characteristics of Phylum \_\_\_\_\_.
  - a) Porifera
  - b) Cnidaria
  - c) Platyhelminthes
  - d) Annelida
- 6) Which of the following animal is included in class Arachnida?
  - a) Limulus
  - b) Eurypterus
  - c) Spider
  - d) Julus
- 7) Clams, snails and slugs are included in which of the following Phylum \_\_\_\_\_.
  - a) Annelida
  - b) Arthropoda
  - c) Mollusca
  - d) Echinodermata
- 8) Which of the following animal is included in class Asteroidea?
  - a) Sea star
  - b) Astropecten
  - c) Asterina
  - d) Solaster

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

**08**

- a) Enlist the classes of phylum Arthropoda.
- b) Define Polymorphism.
- c) Significance of leech.
- d) Define complete metamorphosis (Holometabolous).
- e) Enlist the part of water vascular system of sea star and its significance.

- Q.3 Write short notes on any two of the following.** **08**
- a) Give an account of general characters of phylum Cnidaria.
  - b) What is holozoic nutrition? Give two examples from Protozoa.
  - c) Describe the parasitic adaptations in *Ascaris*.
- Q.4 Answer any two of the following.** **08**
- a) Give an account of general characters of phylum Annelida upto classes.
  - b) Give an account of the life cycle of *Taenia solium*.
  - c) Describe in detail the economic importance of Mollusc.
- Q.5 Answer any one of the following.** **08**
- a) Describe the different methods of locomotion in Protozoa.
  - b) Describe the canal system of Sycon.



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

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) A class of 100 students appeared for two examinations 60 passed the first examination, 50 passed the second examination and 30 passed both examinations. Find the probability that a student selected at random has failed in both the examination.
- c) If A and B are mutually exclusive events. Then show that
- 1)  $P(A/B) = 0$
  - 2)  $P(A/\bar{B}) = \frac{P(A)}{1-P(B)}$

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

08

- a) If  $\Omega = \{1, 2, 3, 4, 5, 6, 7, 8, 9\}$   $A = \{1, 3, 5, 7\}$   $B = \{6, 7, 8, 9\}$   $C = \{2, 4, 8\}$ . List the elements of the subset of  $\Omega$  corresponding to the following events
- 1)  $(\bar{A} \cap B)$
  - 2)  $(\bar{A} \cap B) \cap C$
- b) With usual notation prove that
- 1)  $P(\varphi) = 0$
  - 2)  $P(\bar{A}) = 1 - P(A)$
- c) If A, B, C forms the partition of the sample space. And  $3P(A) = 2P(B) = 6P(C)$  then find  $P(A)$ .

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

08

- a) Define apriori definition of probability. Prove that the apriori definition leads to a probability measure.
- b) If A, B, C are any three events defined on sample space  $\Omega$  with  $P(A) > 0$  then prove that  $P(B \cup C/A) = P(B/A) + P(C/A) - P(B \cap C/A)$ .



- Q.3 Write short notes on any two of the following** **08**
- a) Write a short note on economic importance of fishes.
  - b) Write general features of the Class- Aves.
  - c) Distinguishing Characters of venomous and non-venomous snake.
- Q.4 Answer any Two of the following.** **08**
- a) Difference between Order - Chondrichthyes and Order - Osteichthyes
  - b) Describe the morphological flight adaptations in birds.
  - c) Write general features of the Class- Mammals and describe general features of order Chiroptera with suitable examples.
- Q.5 Answer any one of the following** **08**
- a) Describe the types of snake venom. Add a note on symptoms and first aid treatment of snake bite.
  - b) Describe the various kinds of anatomical flight adaptation in the birds.



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

- a) Reduce the following matrix to Normal form

$$A = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 2 & 2 \\ 2 & 3 & 4 \end{bmatrix}$$

- b) Solve
- $$\begin{aligned} x + 2y - 3z &= 2 \\ 2x + 3y + z &= 4 \\ 3x + 4y + 5z &= 8 \end{aligned}$$
- c) Find all values of  $(-1)^{1/3}$
- d) Separate the complex number  $(i)^i$  in to real and imaginary parts.
- e) Show that that the set N of all natural numbers (i.e. 1, 2, 3, 4,...) is not group with respect to the multiplication operation.

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

- a) Find all eigen values and eigen vectors of the matrix.

$$A = \begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix}$$

- b) If  $\alpha$  and  $\beta$  are roots of the equation  $x^2 - 2x + 4 = 0$  then show that
- $$\alpha^n + \beta^n = 2^{n+1} \cdot \cos\left(\frac{n\pi}{3}\right)$$
- c) 1) Show that the identity element in a group is unique.  
2) Show that the inverse of each element in a group is unique.

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

- a) Investigate for what values of  $a$  and  $b$  the equations
- $$x + 2y + 3z = 4; x + 3y + 4z = 5; x + 3y + az = b$$
- have
- no solution
  - unique solution
  - infinite number of solutions

- b) If
- $\cos(\alpha + i\beta) = x + iy$
- then prove that,

i) 
$$\frac{x^2}{\cosh^2 \beta} + \frac{y^2}{\sinh^2 \beta} = 1$$

ii) 
$$\frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1$$

- c) If
- $x$
- is real, then prove that,

i) 
$$\cosh^{-1} x = \log(x + \sqrt{x^2 - 1})$$

ii) 
$$\tanh^{-1} x = \frac{1}{2} \log\left(\frac{1+x}{1-x}\right)$$

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

- a) i) State and prove Cayley-Hamilton Theorem.

ii) Find the inverse of matrix  $\begin{bmatrix} 0 & 1 & 2 \\ 1 & 0 & -1 \\ 2 & -1 & 0 \end{bmatrix}$  using Cayley-Hamilton Theorem.

- b) i) State and prove De-Moivre's Theorem.

ii) Find all the values of  $(i)^{1/4}$





- Q.3 Write short notes on any two of the following.** **08**
- a) General characters of viruses.
  - b) Scalariform conjugation in *Spirogyra*.
  - c) General characters of Xanthophyta.
- Q.4 Answer any two of the following.** **08**
- a) Describe the Ultra structure of typical bacterial cell with suitable diagram.
  - b) Describe the thallus structure of Nostoc.
  - c) Describe the general characters of Mycoplasma.
- Q.5 Answer any one of the following.** **08**
- a) Give the economic importance of algae.
  - b) Describe the structure of T- Phage with suitable diagram.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Paper-II)**  
**Calculus (22221117)**

Day & Date: Wednesday, 26-07-2023  
 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 Select the correct alternatives each of the following.****08**1) If  $y = (ax + b)^m$  then  $y_n = \underline{\hspace{2cm}}$  if  $m = n$ .

a) 0

b)  $\frac{m!}{(m-n)!} a^n (ax + b)^n$

c)  $n! a^n$

d)  $n! a^n (ax + b)^n$

2) The degree of the homogenous function  $u = \frac{x^{\frac{1}{3}} + y^{\frac{1}{3}}}{x^{\frac{1}{5}} - y}$  is  $\underline{\hspace{2cm}}$ .

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

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

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

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

3)  $\int_0^{\frac{\pi}{2}} \sin^m x \cos^n x dx = \underline{\hspace{2cm}}$  if both  $m$  and  $n$  are odd.

a)  $\frac{m-1}{m+n} \cdot \frac{m-3}{m+n-3} \cdots \frac{1}{n+2} \cdot \frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdot \frac{n-5}{n-4} \cdots \frac{3}{4} \cdot \frac{1}{2} \cdot \frac{\pi}{2}$

b)  $\frac{m-1}{m+n} \cdot \frac{m-3}{m+n-2} \cdot \frac{m-5}{m+n-4} \cdots \frac{2}{n+3} \cdot \frac{1}{n+1}$

c)  $\frac{m-1}{m+n} \cdot \frac{m-3}{m+n-2} \cdots \frac{1}{n+2} \cdot \frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdots \frac{2}{3} \cdot \frac{\pi}{2}$

d)  $\frac{m-1}{m+n} \cdot \frac{m-3}{m+n-2} \cdots \frac{1}{n+2} \cdot \frac{n-1}{n} \cdot \frac{n-3}{n-2} \cdots \frac{2}{3} \cdot 1$

4)  $\text{curl}(\text{grad } \phi) = \underline{\hspace{2cm}}$ .

a)  $\nabla^2 \phi$

b) 0

c)  $\nabla \phi$  or  $\text{grad } \phi$

d) 1

5) The expansion of  $\log(1+x)$  is  $\underline{\hspace{2cm}}$ .

a)  $x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \cdots$

b)  $x - \frac{x^2}{2!} + \frac{x^3}{3!} - \frac{x^4}{4!} + \cdots$

c)  $x + \frac{x^2}{2} + \frac{x^3}{3} + \frac{x^4}{4} + \cdots$

d)  $x - \frac{x^2}{2} + \frac{x^3}{3} - \frac{x^4}{4} + \cdots$

6) The number of independent variable partial derivative are  $\underline{\hspace{2cm}}$ .

a) zero

b) one

c) at most two

d) at least two





- Q.3 Write short notes on any two of the following. 08**
- a) General characters of Zygomycotina.
  - b) General characters of Ascomycotina.
  - c) General characters of Basidiomycotina.
- Q.4 Answer any two of the following. 08**
- a) Enlist the economic importance of Gymnosperms.
  - b) Explain in brief alternation of generation in *Riccia*.
  - c) Explain in brief alternation of generation in *Albugo*.
- Q.5 Answer any one of the following. 08**
- a) Explain in detail sexual reproduction in *Cycas*.
  - b) Explain in detail classification of fungi up to class (as per Ainsworth).

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/Apri-2023  
ELECTRONICS (Paper – I)**

**Basic Circuit Theory and Network Analysis (22221118)**

Day & Date: Thursday, 27-07-2023  
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-tables and calculators is allowed.  
5) Use of Mobile is strictly prohibited.

**Q.1 Multiple choice questions.**

08

- 1) Which one of these is not a passive element?
  - a) Inductor
  - b) Transformer
  - c) Battery
  - d) Fuse
- 2) If the colour bands on a resistor are Grey, Red, Red and Golden respectively. The resistor value will be \_\_\_\_\_.
  - a) 82 K $\Omega$ ,  $\pm$  5%
  - b) 820 K $\Omega$ ,  $\pm$  10%
  - c) 82  $\Omega$ ,  $\pm$  20%
  - d) 8.2 K $\Omega$ ,  $\pm$  5%
- 3) An oscilloscope shows five cycles of sine-wave occurring in five milli seconds. The frequency of the sine-wave is \_\_\_\_\_.
  - a) 1 KHz
  - b) 25 KHz
  - c) 5 KHz
  - d) 10 KHz
- 4) If the peak value of a sine-wave is 20 volts, its RMS value will be approx \_\_\_\_\_.
  - a) 10 volt
  - b) 14 volt
  - c) 20 volt
  - d) 28 volt
- 5) At resonance, the impedance of the series RLC circuit is \_\_\_\_\_.
  - a) Purely resistive
  - b) purely capacitive
  - c) purely inductive
  - d) partly capacitive and partly inductive
- 6) The statement "It is possible to simplify any linear circuit, no matter how complex, to an equivalent circuit with just single current source and parallel resistance connected to load" is the statement of \_\_\_\_\_ theorem.
  - a) Superposition
  - b) Thevenin's
  - c) Norton's
  - d) Maximum Power Transfer
- 7) Which parameters best describe the normal two-port network?
  - a) Z
  - b) Y
  - c) h
  - d) Transmission
- 8) \_\_\_\_\_ theorem states that "In any network, if the voltage sources  $V_1, V_2, \dots, V_n$  in series with internal resistances  $R_1, R_2, \dots, R_n$  respectively, are in parallel then these sources may be replaced by a single voltage source in series with single internal resistance.
  - a) Milliman's
  - b) Max. Power Transfer
  - c) Thevenin's
  - d) Norton's

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

08

- What do you mean by active and passive elements?
- Draw the equivalent electrical diagram of an ideal and practical voltage source.
- Explain bandwidth in brief.
- State Thevenin's theorem.
- Write the four Y-parameter equations.

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

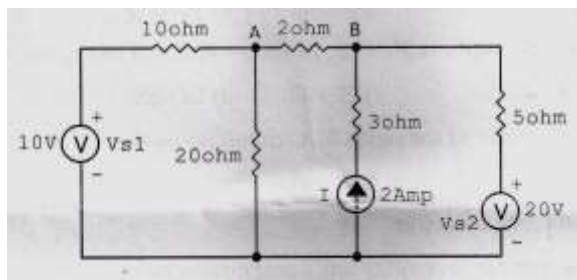
08

- Explain the current-voltage phase relationship for pure inductor or pure capacitor.
- Give the classification of capacitors. Hence write the specifications and applications of any one capacitor.
- Explain Maximum Power Transfer Theorem.

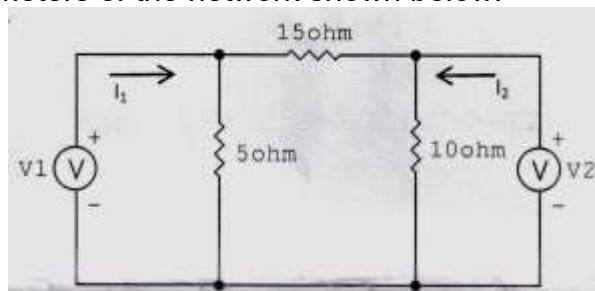
**Q.4 Answer any two of the following.**

08

- Determine the resonant frequency and bandwidth of a series RLC circuit, where  $R = 10\Omega$ ,  $C = 10\ \mu\text{F}$  and  $L = 0.5\ \text{mH}$
- Find the voltage across A and B points i.e.  $2\ \Omega$  resistor using Superposition theorem.



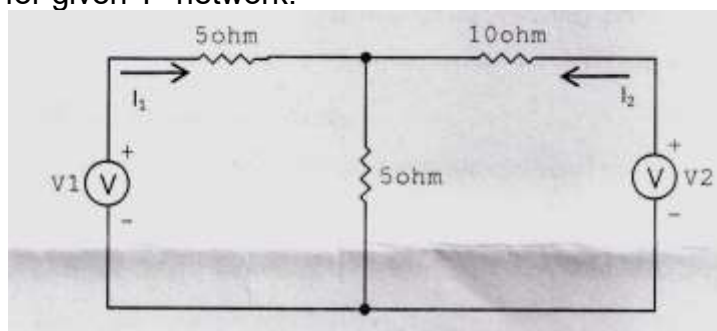
- Find the Z-parameters of the network shown below.



**Q.5 Answer any one:**

08

- Obtain the equation for parallel resonance frequency, bandwidth and quality factor of RLC circuit. Draw the response curve and explain.
- Obtain the h-parameters of a two-port network. Hence determine the h-parameters for given T- network.





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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper – I)**  
**Geomorphology - I (22221124)**

Day & Date: Thursday, 27-07-2023  
 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) Neat diagrams must be drawn wherever necessary.  
 4) Use of map stencils is allowed.

**Q.1 Select the proper alternative and fill in the blank.**

**08**

- 1) Geomorphology is a branch of \_\_\_\_\_ Geography.
  - a) Physical
  - b) Human
  - c) Economic
  - d) Historical
- 2) \_\_\_\_\_ is the scientific analysis of origin and development of the landforms on the earth surface.
  - a) Oceanography
  - b) Climatology
  - c) Geomorphology
  - d) Biogeography
- 3) \_\_\_\_\_ percent area is occupied with land on the earth.
  - a) 29
  - b) 51
  - c) 61
  - d) 71
- 4) The average density of the earth is \_\_\_\_\_ gram 3 cm.
  - a) 4.5.
  - b) 5.5
  - c) 6.5
  - d) 7.5
- 5) The core of the earth is known as \_\_\_\_\_.
  - a) Sail
  - b) Sima
  - c) Nife
  - d) Mantle
- 6) Igneous rocks are also \_\_\_\_\_ rock.
  - a) Primary
  - b) Secondary
  - c) Tertiary
  - d) Quaternary
- 7) Folding is the result of \_\_\_\_\_ movement.
  - a) Sudden
  - b) External
  - c) Slow
  - d) Residual
- 8) \_\_\_\_\_ is a sudden movement.
  - a) Folding
  - b) Faulting
  - c) Earthquake
  - d) Orographic

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

**08**

- a) What is means by Geomorphology?
- b) Stale the names three layers of the interior of the earth.
- c) What is means by fault?
- d) What is a volcano?
- e) State the names of rocks.

- Q.3 Write short notes on any two of the following. 08**
- a) Nature of Geomorphology.
  - b) Describes the types of faults.
  - c) Describes of cause of volcanoes.
- Q.4 Answer any two of the following. 08**
- a) Describes the types of igneous rocks.
  - b) Explain the interior structure of the earth.
  - c) Describes the importance of Geomorphology.
- Q.5 Answer any one of the following. 08**
- a) What is earthquake? Explain its causes and effects.
  - b) Describes the types of folding.



- Q.3 Write short notes on any two of the following. 08**
- a) Explain layers of Atmosphere.
  - b) Describe rock cycle.
  - c) Explain products of Volcano.
- Q.4 Answer any two of the following. 08**
- a) Explain Central eruption of volcano.
  - b) Explain seismograph and seismograph.
  - c) Explain Physical weathering.
- Q.5 Answer any one of the following. 08**
- a) Explain Nebular hypothesis.
  - b) Describe Internal Structure of the Earth.



- Q.2 Answer any four of the following.** **08**
- a) Give the signed binary representation of signed decimal number -14.
  - b) Obtain the Excess-3 code for decimal 29.
  - c) Draw the negative logic truth-table for AND gate.
  - d) Apply the DeMorgan's theorem to logic equation  $\overline{\overline{A + B + B \cdot C}}$
  - e) Draw the logic diagram of Ex-OR gate as controlled-inverter.
- Q.3 Write short note on any two of the following.** **08**
- a) ASCII Code.
  - b) Organization of Digital Computer.
  - c) Hexadecimal Number System.
- Q.4 Answer any two of the following.** **08**
- a) Draw the Karnaugh map for 4-variables and apply it for the given logic equation  $\overline{A}BCD + \overline{A}B\overline{C}D + AB\overline{C}D + ABCD + AB\overline{C}\overline{D} + \overline{A}B\overline{C}\overline{D} + A\overline{B}C\overline{D}$
  - b) Explain 4-bit parallel binary adder.
  - c) Explain NOR gate as universal gate.
- Q.5 Answer any one:** **08**
- a) Draw the pin diagrams for IC 7400, 7402, 7404 and 7486. Explain in brief.
  - b) Explain Half and Full subtractor with proper logic diagram and truth-table.

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**B.Sc. (Semester - I) (New) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper - II)**  
**Geomorphology - II (22221125)**

Day & Date: Friday, 28-07-2023  
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ weathering is carried on by vegetation and animal.
  - a) Physical
  - b) Chemical
  - c) Biological
  - d) None of these
- 2) \_\_\_\_\_ is erosional landform of Glaciers.
  - a) Horns
  - b) Eskers
  - c) Yardang
  - d) Waterfall
- 3) \_\_\_\_\_ has postulated the concept of 'cycle of erosion'.
  - a) R.A. Ray
  - b) Charles Darwin
  - c) W.M. Davis
  - d) A. Wegener
- 4) Beaches are the depositional landforms made by \_\_\_\_\_.
  - a) Glaciers
  - b) Winds
  - c) Oceanic waves
  - d) None of these
- 5) \_\_\_\_\_ erosional landform of wind.
  - a) Rapids
  - b) Leaves
  - c) Barkhan
  - d) Zeugen
- 6) Delta is formed due to the depositional work of \_\_\_\_\_.
  - a) Glaciers
  - b) Winds
  - c) River
  - d) None of these
- 7) Oxidation is \_\_\_\_\_ type of weathering.
  - a) Biological
  - b) Physical
  - c) Chemical
  - d) None of these
- 8) \_\_\_\_\_ is a function of structure, process and time.
  - a) Landscape
  - b) Volcano
  - c) Earthquake
  - d) None of these

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

**08**

- a) What is Geomorphic Process?
- b) What is weathering?
- c) What is Mushroom Rock?
- d) What is Flood Plain?
- e) What is Mass Wasting?
- f) What is Barkhan?

- Q.3 Write Short notes on any two of the following. 08**
- a) Waterfall
  - b) Erosion
  - c) U Shaped Valley
- Q.4 Answer any two of the following. 08**
- a) Explain the types of Chemical Weathering?
  - b) Explain the Trio of Devis?
  - c) Explain the Meanders and Ox-Bow Lake?
- Q.5 Answer any one of the following. 08**
- a) What is mass wasting? Explain the types of mass wasting?
  - b) Explain the erosional landform of River?





- Q.3 Write short notes on any two of the following. 08**
- a) Morphology of Turritella.
  - b) Classification and Geological age of Spirifer and Nautilus.
  - c) Morphology of Micraster.
- Q.4 Answer any two of the following. 08**
- a) Explain conditions of fossilization.
  - b) Explain morphology of Trilobites.
  - c) Describe morphology of Voluta and Tubipora.
- Q.5 Answer any one of the following. 08**
- a) Explain evolutionary history of horse.
  - b) Explain Morphology, distribution and Significance of Gondwana flora.



- Q.3** a) Define communication and describe the process of communication in detail. **10**  
OR  
b) Write a note on the Formal and Informal channels of communication.
- Q.4** Describe a Super Market in your city with all the details. **10**

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Paper - I)**  
**Physical Chemistry (19201106)**

Day & Date: Wednesday, 19-07-2023  
 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 algorithmic tables and calculator is allowed.  
 (At. Wt. H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

**Q.1 Choose the most correct alternative and rewrite the sentence:**

**08**

- 1) If the rate expression for the reaction is  $(dx/dt) = KA^{1/2}B^{3/2}$ . The overall order of the reaction is \_\_\_\_\_.
 

a) 3/2	b) 1/2
c) 2	d) 3
- 2) Van der Waals equation explains the behavior of \_\_\_\_\_.
 

a) mixture of gases	b) real gases
c) ideal gases	d) none of the above
- 3) Efficiency of a heat engine is \_\_\_\_\_.
 

a) zero	b) one
c) less than one	d) greater than one
- 4) Ostwald's isolation method is used to determine \_\_\_\_\_ of reaction.
 

a) order	b) molecularity
c) rate	d) velocity
- 5) The equation,  $y = mx + c$ , represents \_\_\_\_\_.
 

a) Parabola	b) Hyperbola
c) Straight line	d) none of these
- 6) The unit of  $a$  in Van der Waals equation is \_\_\_\_\_.
 

a) $Nm^{-2}(dm^3)^2mole^{-2}$	b) $Nm^{-2}(dm^3)^{-2}mole^{-2}$
c) $Nm^{-2}(dm^3)^2mole^{-1}$	d) $Nm^{-2}(dm^3) mole^{-2}$
- 7) The unit of rate constant for a first order reaction is \_\_\_\_\_.
 

a) $dm^3sec^{-1}$	b) $dm^3mole^{-1}sec^{-1}$
c) $sec^{-1}$	d) $sec^{+1}$
- 8) In a certain graph, the straight line obtained is parallel to x-axis. Hence its slope is \_\_\_\_\_.
 

a) zero	b) - 1
c) + 1	d) 0.5

- Q.2 Answer any four of the following:** **08**
- a) Write the kinetic equations for second order reaction, when reacting substances are at the same initial concentration and at different initial concentrations.
  - b) Write any two rules of differentiation.
  - c) Give any two statements of second law of thermodynamics.
  - d) Write the reaction of hydrolysis of methyl acetate in presence of HCl.
  - e) What do you mean by ideal gas and non-ideal gas?
  - f) What is continuity of a state?
- Q.3 Attempt any two of the following:** **08**
- a) Explain definite integral and write one example related to chemistry.
  - b) Write and explain the Joule-Thomson effect.
  - c) Write a note on partial derivative.
- Q.4 Attempt any two of the following.** **08**
- a) Derive an expression for velocity constant of a first order reaction.
  - b) A second order reaction where  $a = b$  is completed to the extent of 40 percent in 480 seconds. How long will it take for the reaction to go to 70 percent completion?
  - c) What is an isotherm? Explain Andrew's isotherm for carbon dioxide gas.
- Q.5 Attempt any one of the following:** **08**
- a) What are the requirements for liquification of gases? The critical temperature and the critical pressure for a gas 562 K and  $48.6 \times 1.013 \times 10^5 \text{ Nm}^{-2}$  respectively.  
 $R = 0.08205 \times 1.013 \times 10^5 \text{ dm}^3 \text{ Pa K}^{-1} \text{ mol}^{-1}$ . Find the Van der Wall's constants  $a$  and  $b$ .
  - b) What do you understand by Carnot theorem? Calculate the minimum amount of heat that must be withdrawn from the hot reservoir at 410 K to obtain work equal to 15 kJ per cycle. The lower temperature of the cycle is 290K.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper – I)**  
**Fundamental of Computer (19201120)**

Day & Date: Wednesday, 19-07-2023  
 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 Correct Alternatives.**

**08**

- 1) Which of the following is the smallest unit of storage?
 

a) GB	b) KB
c) MB	d) TB
- 2) Default extension of power point file is \_\_\_\_\_.
 

a) .txt	b) .pptx
c) .docx	d) all of these.
- 3) To save a new text file \_\_\_\_\_ short cut key is used.
 

a) Ctrl + Z	b) Ctrl + O
c) Ctrl + V	d) Ctrl + S
- 4) The bar at the bottom of a window that holds no. of applications is known as \_\_\_\_\_.
 

a) title bar	b) status bar
c) menu bar	d) task bar
- 5) Magnetic tape is \_\_\_\_\_ storage device.
 

a) Random	b) Sequential Accessed
c) Track	d) None of These
- 6) Computer Monitor is also known as \_\_\_\_\_.
 

a) DVU	b) UVD
c) VDU	d) CCTV
- 7) 1Gb is equal to \_\_\_\_\_.
 

a) 1024 bytes	b) 1024 Kb
c) 1024 Mb	d) 1024 Tb
- 8) \_\_\_\_\_ is the volatile memory of computer.
 

a) RAM	b) ROM
c) Both a and b	d) None of the Above

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

**08**

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

- Q.3 Write short notes on any two of the following. 08**
- a) Smart art and charts
  - b) Primary memory
  - c) Microcomputer
- Q.4 Answer any Two of the following. 08**
- a) Explain mouse and its types.
  - b) How to create power point presentation file.
  - c) Write any four excel functions with example.
- Q.5 Answer any one of the following questions. 08**
- a) Write the steps of mail merge.
  - b) Write the features of MS-Word.





- Q.3 Write notes on any two of the following.** **08**
- a) VSEPR theory.
  - b) Shape of p orbital.
  - c) LCAO principle.
- Q.4 Attempt any two the following** **08**
- a) Discuss the s-s and s-px overlapping.
  - b) What are Fajan's rules? Give its significance?
  - c) Explain the formation of BeC<sub>12</sub> molecule.
- Q.5 Answer any one of the following.** **08**
- a) What is electron affinity? Discuss its trend in a period and in a group in the periodic table.
  - b) Describe the structure of rock salt with respect to unit cell, co-ordination number and stoichiometry.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper-II)**  
**Programming Using C-I (19201121)**

Day & Date: Thursday, 20-07-2023  
 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 table and calculator is allowed.

**Q.1 Multiple choice questions**

**08**

- 1) \_\_\_\_\_ is the name given to memory address where data is stored.
  - a) Operator
  - b) Variable
  - c) Keyword
  - d) Special symbol
- 2) The range of integer data type varies from \_\_\_\_\_ to \_\_\_\_\_.
  - a) -128 to 127
  - b) -32768 to 32767
  - c) 3.4e-38 to 3.4e+38
  - d) None of these
- 3) \_\_\_\_\_ format code is used to read long integer.
  - a) %d
  - b) %f
  - c) %ld
  - d) %lf
- 4) Which of the following is a valid example of string constant?
  - a) "sizeof"
  - b) 'emp'
  - c) 'byte'
  - d) 'address'
- 5) \_\_\_\_\_ is the unconditional branching statement.
  - a) For
  - b) Switch
  - c) If
  - d) Goto
- 6) \_\_\_\_\_ function not belongs to math.h header file.
  - a) clrscr()
  - b) pow()
  - c) Log10()
  - d) None of these.
- 7) The statement terminator is \_\_\_\_\_.
  - a) ;
  - b) :
  - c) #
  - d) }
- 8) \_\_\_\_\_ escape sequence character causes to transfer control to next line.
  - a) \t
  - b) \a
  - c) \n
  - d) \b

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

**08**

- a) What is debugging?
- b) What is flowchart?
- c) Define problem.
- d) What is tracing?
- e) What is reserve word?
- f) What is Compiler and interpreter?

- Q.3 Write short notes on any two of the following** **08**
- a) Table of String
  - b) Pseudo Code
  - c) Characteristics of algorithm
- Q.4 Answer any Two of the following** **08**
- a) Write a program to display addition of matrix.
  - b) What is programming languages? Explain all types.
  - c) Define error? Explain all types of error.
- Q.5 Answer any one of the following** **08**
- a) What are the inbuilt string handling functions? Explain any four functions in details.
  - b) What is array? Explain all the types of array.



- Q.2 Answer any four of the following. 08**
- Calculate the difference of pressure between the two sides of the surface of a spherical drop of water of radius 0.4 mm. Surface tension of water is 0.075 N/m.
  - Define critical velocity and write its equation.
  - Write the equation of moment of inertia of flywheel.
  - Define compound pendulum and torsional pendulum.
  - List the factors affecting surface tension.
  - Define Young's modulus and Bulk modulus.
- Q.3 Write short notes on any two of the following. 08**
- Jaeger's method to determine the surface tension of a liquid.
  - The effect of temperature and pressure on the viscosity of liquid.
  - Theory of Poisson's ratio of rubber tube.
- Q.4 Answer any Two of the following. 08**
- Calculate M.I. of a circular disc of mass 500 gm and diameter 0.2m
    - about its diameter and
    - about its centre and perpendicular to its plane.
  - Explain the sources of errors in Kater's pendulum.
  - The pressure inside a soap bubble balances 0.14cm of an oil column. Surface tension of the soap solution is 30 dyne/cm and density of the oil is 800 kg/m<sup>3</sup>. Calculate the radius of soap bubble.
- Q.5 Answer any one of the following. 08**
- State and prove the Bernoulli's theorem for the flow of liquids in pipes. Water flows through a horizontal pipe of varying cross-section. The velocity of flow is 60 cm/s where the pressure of water is  $7 \times 10^4$  dyne/cm<sup>2</sup>. What will be the pressure if the velocity is 40 cm/s? ( $\rho = 1$  gm/cm<sup>3</sup>)
  - Derive the relation between elastic constants.



- Q.2 Answer any four of the following.** **08**
- 1) Enlist the various branches of microbiology.
  - 2) Draw the structure of typical bacterial cell and label to the specific structure and organelle of the cell.
  - 3) Write the general properties of the viroids.
  - 4) Write in short about economic importance of protozoa.
  - 5) Write in short about contribution of Alexander Fleming.
  - 6) Define virus and give any two examples of it.
- Q.3 Write short note on any two of the following.** **08**
- a) Write note on various beneficial and harmful activities of microorganisms.
  - b) Describe in short about structure of capsule of bacteria.
  - c) What is Acellular microorganisms and describe in short about general properties of virus.
- Q.4 Answer any two of the following.** **08**
- a) Describe in detail about the structure of plasma membrane of bacteria.
  - b) Write in detail about general characteristics of Archaeobacteria.
  - c) Enlist the various differences between prokaryotic and eukaryotic cell.
- Q.5 Answer any one of the following.** **08**
- a) Describe in detail about structure and function of Gram negative bacterial cell wall.
  - b) Define soil microbiology and describe in detail about contribution of Martinus Beijerinck and Sergei Winogradsky.



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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**PHYSICS (Paper – II)**  
**Optics and Laser (19201105)**

Day & Date: Saturday, 22-07-2023  
 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) Neat labelled diagrams must be drawn wherever necessary.  
 4) Use of log table and calculator is allowed.

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ principle states that the travelling between two points will follow the route with smallest optical path length.
  - a) Fermat
  - b) Newton
  - c) Einstein
  - d) Gauss
- 2) The lowest existing energy state is called \_\_\_\_\_ state.
  - a) metastable
  - b) normal excited
  - c) excited
  - d) ground
- 3) The mode of achieving population inversion in Ruby laser by \_\_\_\_\_.
  - a) optical pumping
  - b) forward basing
  - c) chemical reaction
  - d) inelastic scattering
- 4) Newton's ring Demonstrate the phenomenon of \_\_\_\_\_.
  - a) diffraction
  - b) polarization
  - c) interference
  - d) dispersion
- 5) A beam of monochromatic light is incident on a plane transmission grating having 6000 lines/cm and the second order spectral line found to be diffracted at  $30^\circ$ . The wavelength of the light is \_\_\_\_\_.
  - a) 4166 Å
  - b) 4233 Å
  - c) 3324 Å
  - d) 4343 Å
- 6) The aperture is called as a \_\_\_\_\_ of lens.
  - a) perimeter
  - b) diameter
  - c) length
  - d) radius of curvature
- 7) Fraunhofer diffraction equation is used to model the diffraction of waves when the diffraction pattern is viewed at a \_\_\_\_\_ distance from the diffraction object.
  - a) short
  - b) long
  - c) medium
  - d) tiny
- 8) \_\_\_\_\_ spectrum/s can be achieved by prism spectra.
  - a) 1
  - b) 2
  - c) 3
  - d) 4

- Q.2 Answer any four of the following. 08**
- a) State the methods to minimize chromatic and spherical aberration.
  - b) Define diffraction grating and grating element.
  - c) Distinguish between Fresnel and Fraunhofer diffraction.
  - d) What do you mean by metastable state in laser?
  - e) Draw the neat labelled diagram of Gauss eye-piece.
  - f) List the applications of laser in different fields.
- Q.3 Write short notes on any two of the following. 08**
- a) Write a note short on Newton's rings.
  - b) Write a note on Einstein's coefficients and Einstein's relation.
  - c) Write a note on determining wavelength of spectral lines using plane diffraction grating.
- Q.4 Answer any two of the following. 08**
- a) Light of wavelength  $5893 \text{ \AA}$  is incident on a glass plate of refractive index 1.33 such that the angle of refraction is  $60^\circ$ . Calculate the thickness of the plate which will make it dark by reflection.
  - b) Obtain an expression fringe width of wedge shaped film.
  - c) Obtain first law of reflection by Fermat's principle.
- Q.5 Answer any one of the following. 08**
- a) Explain in brief principle, construction and working of optical bench.
  - b) A lens is made up of focal length of 48 cm. Calculate longitudinal chromatic aberration if refractive index  $\mu_v$  for one colour is 1.45 and other is 1.5.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Paper – II)**  
**Basic Techniques in Microbiology (19201115)**

Day & Date: Saturday, 22-07-2023  
 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.

**Q.1 Rewrite the sentences by selecting correct alternatives given below. 08**

- 1) \_\_\_\_\_ of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed.
 

a) Eye piece	b) Objective
c) Condenser	d) Magnifying lens
- 2) \_\_\_\_\_ is example of differential staining.
 

a) Simple staining	b) Positive staining
c) Negative staining	d) Acid fast staining
- 3) Rn Cram-stanning alcohol acts as \_\_\_\_\_.
 

a) Fixative	b) Stain
c) Decolorizer	d) Mordent
- 4) \_\_\_\_\_ is basic stain.
 

a) Crystal violet	b) Nigrosine
c) Eosin	d) Congo-Rent
- 5) Rn Autoclave temperature of sterilization is \_\_\_\_\_.
 

a) 60°C	b) 180°C
c) 121°C	d) 160°C
- 6) \_\_\_\_\_ is used for purification of water.
 

a) Alcohol	b) Chlorine
c) UV light	d) heat
- 7) Cell wall is stained by \_\_\_\_\_.
 

a) Albert's method	b) Giemsa method
c) Chance's method	d) Baelyes method
- 8) UV light is \_\_\_\_\_ agent used for Sterilization.
 

a) Chemical	b) Physical
c) Biological	d) Physico-Chemical

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

- a) Define magnification power.
- b) Define sterilization.
- c) List chemicals used for sterilization.
- d) Examples of antiseptic agents.
- e) Define resolving power.
- f) Give role of Iodine in Gram- staining.

- Q.3 Write short notes on any two of the following. 08**
- a) Capsule staining.
  - b) Streak plate technique.
  - c) Introduction to electron microscope.
- Q.4 Answer any Two of the following. 08**
- a) Write on classification of stains.
  - b) Negative staining.
  - c) Write on gaseous sterilization.
- Q.5 Answer any one of the following. 08**
- a) Power plate method.
  - b) Physical method used in sterilization.

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**B.Sc. (Semester – I) (Old) (CBCS) Examination: March/April-2023**  
**STATISTIC (Paper - I)**  
**Descriptive Statistics - I (19201108)**

Day & Date: Sunday, 23-07-2023  
 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) Use of calculator is allowed.

**Q.1 Multiple choice questions:**

**08**

- 1) Primary data means \_\_\_\_\_.
  - a) Original data
  - b) It may be result of survey
  - c) It may be result of enquiry
  - d) All the above
- 2) Mode of a distribution can be obtained from \_\_\_\_\_.
  - a) Histogram
  - b) Less than ogive
  - c) More than ogive
  - d) None of these
- 3) The value of  $P_{50}$  \_\_\_\_\_.
  - a) is equal to  $Q_1$
  - b) is equal to  $D_5$
  - c) is equal to  $Q_3$
  - d) None of these
- 4) If the first and last class intervals are open, then we can use \_\_\_\_\_ as a measure of dispersion.
  - a) Range
  - b) Quartile Deviation
  - c) Mean Deviation
  - d) Coefficient of Variation
- 5) If Bowley's coefficient of skewness is +1 then the median is equal to \_\_\_\_\_.
  - a)  $Q_1$
  - b)  $Q_3$
  - c) Mode
  - d) Mean
- 6) Which of the following is suitable measure of central tendency for the data 0, 2, 3, -4, 6, 2?
  - a) Only G.M
  - b) Only A.M.
  - c) Only H.M.
  - d) Both A.M. and G.M.
- 7) Mean deviation is least when measured from \_\_\_\_\_.
  - a) Mean
  - b) Median
  - c) Mode
  - d) Zero
- 8) If the distribution is symmetric, then all \_\_\_\_\_ moments are zero.
  - a) even ordered central
  - b) odd ordered central
  - c) odd ordered raw
  - d) raw and central

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

**08**

- a) Define class mark and class interval.
- b) Define A.M. and H.M.
- c) State empirical relation between mean, median and mode.
- d) Define quartile deviation and coefficient of Quartile Deviation.
- e) Define Raw moment and Central moment.
- f) Define Karl Pearsons coefficient of skewness.

- Q.3 Write short notes on any two of the following** **08**
- a) Distinguish between qualitative data and quantitative data.
  - b) Find mean of first  $n$  natural numbers.
  - c) State and prove minimal property of mean square deviation.
- Q.4 Answer any Two of the following.** **08**
- a) State and prove effect of change of origin and scale on A.M.
  - b) Given that  $n = 10$ ,  $\sum(X - 20) = 8$ ,  $\sum(X - 20)^2 = 762$  Find mean, S.D. and C.V.
  - c) Write a note on skewness.
- Q.5 Answer any one of the following** **08**
- a) Define median and derive the formula for median in case of continuous frequency distribution.
  - b) Obtain the first four central moments in terms of central moments.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Paper - I)**  
**Animal Diversity I (19201122)**

Day & Date: Sunday, 23-07-2023  
 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 table and calculator is allowed.

**Q.1 Multiple Choice Questions.**

**08**

- 1) Earthworm belongs to \_\_\_\_\_ class of phylum annelida.
  - a) Polychaeta
  - b) Oligochaeta
  - c) Hirudinea
  - d) Mammalia
- 2) Nutrition mode of amoeba is \_\_\_\_\_.
  - a) Holozoic
  - b) Saprophytic
  - c) Merozoic
  - d) Desmozoic
- 3) The body surface of sycon is perforated by numerous pores, called as \_\_\_\_\_.
  - a) Ostia
  - b) Prosopyle
  - c) Choanopores
  - d) Desmosomes
- 4) In Cnidaria \_\_\_\_\_ is umbrella shaped, centrally located mouth and marginal tentacles.
  - a) Polyp
  - b) Medusa
  - c) Sepia
  - d) Ilech
- 5) Liver fluke is example of phylum \_\_\_\_\_.
  - a) Annelida
  - b) Platyhelminthes
  - c) Mollusca
  - d) Arthropoda
- 6) Arthropod eyes are called compound eyes, are made up of repeating units, the \_\_\_\_\_ each of which functions as a separate visual receptor.
  - a) Oomatidium
  - b) Phallomere
  - c) Mandibles
  - d) Cochlea
- 7) In \_\_\_\_\_ class of phylum mollusca body shell is composed with 6-8 plates.
  - a) Aplacophora
  - b) Monoplacophora
  - c) Polyplacophora
  - d) Globosa
- 8) \_\_\_\_\_ bears spiny skin surface.
  - a) Protozoa
  - b) Annelida
  - c) Echinodermata
  - d) Mollusca

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

**08**

- a) Write any two economic importance of phylum Mollusca.
- b) Define the term polymorphism.
- c) Name the locomotory organs and type of locomotion in paramecium.
- d) Write two sub classes of arthropoda with an example.
- e) What is endoparasite?
- f) Write any two parasitic adaptations in *Ascaris lumbricoides*.

- Q.3 Write short notes on any two of the following. 08**
- a) Discuss economic importance in insects.
  - b) Explain the mechanism of locomotion in amoeba.
  - c) Write any four general characters of phylum Arthropoda.
- Q.4 Answer any Two of the following. 08**
- a) Describe water vascular system in Asteroidea.
  - b) Write general characters of phylum annelida.
  - c) Discuss any two classes of Phylum Echinodermata.
- Q.5 Answer any one of the following. 08**
- a) Explain in detail life history of Taenia solium.
  - b) Describe canal system in Sycon.





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

08

- a) Explain Random experiment.
- b) Define Union of two events
- c) If  $P(A) = 0.6, P(B) = 0.5, P(A \cap B) = 0.3$  Compute  $P(\bar{A} \cap \bar{B})$
- d) For any two events A and B. Define conditional probability  $P(A/B)$ .
- e) If A and B are independent events with  $P(A) = \frac{1}{4}, P(B) = \frac{1}{3}$ . Find  $P(A \cup B)$
- f) Define probability mass function (p. m. f.)

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

08

- a) With usual notation prove that
  - 1)  $P(\varphi) = 0$
  - 2)  $P(\bar{A}) = 1 - P(A)$
- b) If A and B are mutually exclusive events. Then show that
  - 1)  $P(A/B) = 0$
  - 2)  $P(A/\bar{B}) = \frac{P(A)}{1-P(B)}$
- c) If X takes values  $-2, -1, 0, 1, 2$  with probabilities 0.2, 0.1, 0.3, 0.2, 0.2 respectively. Find the probability distribution of  $|X|$ . Also find mode of  $|X|$

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

08

- a) 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)  $P(A \cap \bar{B})$
- b) 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
- c) A r. v. X has p.m.f.

X:	1	2	3	4
P(x):	k	2k	2k	3k

- Find
- 1) k
  - 2)  $P[X - 2 < 0]$

**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) A r. v. X has the following probability distribution.

X:	1	2	3	4	5	6	7
P(x):	1/8	2/8	3/8	1/64	9/64	2/64	4/64

- Find
- 1)  $P(2 < X < 6)$
  - 2)  $P(X \geq 5)$
  - 3) distribution function of X
  - 4) Median of X.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**ZOOLOGY Paper-II**  
**Animal Diversity-II (19201123)**

Day & Date: Monday, 24-07-2023  
 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 Multiple choice questions**

**08**

- 1) Reptiles are:
  - a) warm blooded.
  - b) cold blooded.
  - c) hot blooded.
  - d) all of the above
- 2) Which of the following has a cartilagenous endoskeleton \_\_\_\_\_
  - a) Chondrichthes
  - b) Dipnoi
  - c) Mollusca
  - d) Bony fishes
- 3) Most Unique mammalian character is \_\_\_\_\_.
  - a) Presence of mammary glands
  - b) Four chambered Heart
  - c) Adapted to fly or live in water
  - d) All the above
- 4) Which of the following are flightless bird \_\_\_\_\_
  - a) Emu
  - b) Ostrich
  - c) Cossowary
  - d) All of these.
- 5) Notochord is restricted to tail region only in \_\_\_\_\_.
  - a) Hemichordata
  - b) Cephalochordata
  - c) Tunicata
  - d) None of these
- 6) The animal who possesses notochord throughout life is \_\_\_\_\_.
  - a) Fish
  - b) Amphioxus
  - c) Bird
  - d) Snake
- 7) Petromyzon belongs to \_\_\_\_\_.
  - a) Angatha
  - b) Gnathostomata
  - c) Protochordata
  - d) Euchordata
- 8) Animals giving birth to young ones are called \_\_\_\_\_.
  - a) Oviparous
  - b) Viviparous
  - c) Coelomate
  - d) Amphibious

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

**08**

- a) What is phylogeny?
- b) Indirect parental care in Amphibia.
- c) General characters of phylum protochordate
- d) Snake venom
- e) Duckbill platypus

- Q.3 Write short notes on any two of the following.** **08**
- a) Poison apparatus of the snake.
  - b) General characters of the class Pisces.
  - c) Economic importance of fishes.
- Q.4 Answer any Two of the following.** **08**
- a) First aid treatment of snake bite
  - b) Direct parental care in amphibian.
  - c) General characters of class Pisces
- Q.5 Answer any one of the following.** **08**
- a) Describe various kinds of flight adaptations in birds.
  - b) Describe identification keys of poisonous and non-poisonous snake.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Paper - I)**  
**Algebra (19201116)**

Day & Date: Tuesday, 25-07-2023  
 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 and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

**Q.1 Choose the correct alternative for each of the following.****08**

- 1) A square matrix  $A = [a_{ij}]$  is symmetric iff \_\_\_\_\_.  
 a)  $a_{ij} = a_{ji}$  for  $i$  and  $j$                       b)  $a_{ij} = a_{ji}$  for some  $i$  and  $j$   
 c)  $a_{ij} = -a_{ji}$  for all  $i$  and  $j$                 d)  $a_{ij} = 0$  for all  $i$  and  $j$
- 2) If  $A$  is a square matrix, then the matrix  $A - A^T$  is \_\_\_\_\_.  
 a) Symmetric                                      b) Skew-symmetric  
 c) Triangular                                      d) None of these
- 3) If rank of  $[A] = \text{rank of } [A : B] < \text{number of unknowns}$ , then system of linear equations  $AX = B$  possess \_\_\_\_\_.  
 a) Unique solution                                b) No solution  
 c) Infinite solution                                d) Trivial solution
- 4) Eigen values of the matrix  $\begin{bmatrix} 2 & 3 & 5 \\ 0 & 3 & 5 \\ 0 & 0 & 4 \end{bmatrix}$  are \_\_\_\_\_.  
 a) 5, 5, 4    b) 2, 3, 4  
 c) 2, 3, 5    d) 2, 3, 3
- 5)  $(\sin \theta + i \cos \theta)^n =$  \_\_\_\_\_.  
 a)  $\sin n\theta + i \cos n\theta$                               b)  $\cos n\left(\frac{\pi}{2} - \theta\right) + i \sin n\left(\frac{\pi}{2} - \theta\right)$   
 c)  $\cos n\theta + i \sin n\theta$                               d)  $\cos\left(\frac{\pi}{2} - \theta\right) + i \sin\left(\frac{\pi}{2} - \theta\right)$
- 6) Every real number is a complex number whose imaginary part is \_\_\_\_\_.  
 a) 2    b) 1  
 c) -1     d) 0
- 7) The value of  $(i)^i =$  \_\_\_\_\_.  
 a)  $e^{\pi/2}$     b)  $e^{-\pi/2}$   
 c)  $e^{i\pi/2}$     d)  $e^{-i\pi/2}$
- 8) The value of  $\cosh z - \sinh z =$  \_\_\_\_\_.  
 a)  $e^{iz}$     b)  $e^{-iz}$   
 c)  $e^z$     d)  $e^{-z}$

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

- 1) Find the rank of the matrix

$$A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 7 \\ 3 & 6 & 10 \end{bmatrix}$$

- 2) Find the characteristic equation of the matrix  $\begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$
- 3) Find the value of  $\left(\cos \frac{\pi}{2} + i \sin \frac{\pi}{2}\right)^2$
- 4) Find the all values of  $(-1)^{\frac{1}{3}}$
- 5) Separate the real and imaginary parts of  $\cosh(x + iy)$

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

08

- 1) Solve

$$2x - 3y + z = 0$$

$$x + 2y - 3z = 0$$

$$4x - y - 2z = 0$$

- 2) If
- $\alpha, \beta$
- are the roots of equation
- $x^2 - 2\sqrt{3}x + 4 = 0$
- then prove that
- $\alpha^3 + \beta^3 = 0$

- 3) If
- $\cos(\alpha + i\beta) = x + iy$
- then prove that

$$\text{a) } \frac{x^2}{\cosh^2 \beta} + \frac{y^2}{\sinh^2 \beta} = 1$$

$$\text{b) } \frac{x^2}{\cos^2 \alpha} - \frac{y^2}{\sin^2 \alpha} = 1$$

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

08

- 1) Test for consistency the following equations and if possible, solve

$$x + y + z = -3; \quad 3x + y - 2z = -2; \quad 2x + 4y + 7z = 7$$

- 2) Solve:
- $x^7 - x^4 + x^3 - 1 = 0$

- 3) Show that:

$$[\sin(\alpha - \theta) + e^{i\alpha} \sin \theta]^n = \sin^n \alpha \cdot e^{in\theta}$$

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

08

- 1) Find all eigen values and eigen vectors of the matrix

$$A = \begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$$

- 2) If
- $x$
- is real number then prove that:

$$\text{a) } \cosh^{-1} x = \log(x + \sqrt{x^2 - 1})$$

$$\text{b) } \tanh^{-1} x = \frac{1}{2} \log\left(\frac{1+x}{1-x}\right)$$

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**BOTANY (Paper - I)**  
**Microbiology and Phycology (19201102)**

Day & Date: Tuesday, 25-07-2023  
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

**Q.1 Answer the following questions by choosing correct alternative given below. 08**

- 1) Viruses require \_\_\_\_\_ for growth.
 

a) Bacteria	b) Plants
c) Animals	d) living cells
- 2) Laminarin is an energy storage material characteristic of \_\_\_\_\_.
 

a) Chlorophyta	b) Chrysophyta
c) Phaeophyta	d) Pyrrophyta
- 3) Membranous in folding in bacterial cell at which replication starts is \_\_\_\_\_.
 

a) Carboxysomes	b) Magnetosome
c) Nucleosome	d) Mesosomes
- 4) The mode of reproduction which occurs in mycoplasma is \_\_\_\_\_.
 

a) Budding	b) Bursting
c) Binary fission	d) Binary fusion
- 5) From the following the filamentous bacteria are called as \_\_\_\_\_.
 

a) Vibrio	b) Actinomycetes
c) Spirochate	d) Mycoplasma
- 6) The bacterial pili mainly contain \_\_\_\_\_.
 

a) Carbohydrates	b) Lipids
c) Proteins	d) Minerals
- 7) Usually viruses are separated into several large groups based primarily on \_\_\_\_\_.
 

a) nature of the host
b) nucleic acid characteristics
c) capsid symmetry
d) diameter of the virion or nucleocapsid
- 8) Agar, which is the solidifying agent in many bacterial culture media, is part of the cell wall of \_\_\_\_\_.
 

a) Chlorophyta	b) Chrysophyta
c) Pyrrophyta	d) Rhodophyta

- Q.2 Answer any four of the following. 08**
- a) What are endospores?
  - b) Enlist the different type of spores formed in algae.
  - c) Give classification of spirogyra.
  - d) what are mycoplasma?
  - e) what is selective media?
  - f) Give any two mode of reproduction in bacteria.
- Q.3 Write short notes on any two of the following. 08**
- a) General characters of viruses.
  - b) Give broad outline of classification of algae.
  - c) Give general characters of chlorophyta.
- Q.4 Answer any Two of the following. 08**
- a) Explain the conjugation in spirogyra with suitable diagram.
  - b) Explain the structure of bacterial cell with suitable diagram.
  - c) Describe the thallus structure of Nostos.
- Q.5 Answer any one of the following. 08**
- a) Give the general characters of bacteria.
  - b) Explain the economic importance of algae.



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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Paper-II)**  
**Calculus (19201117)**

Day & Date: Wednesday, 26-07-2023  
 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 each of the following.****08**

- 1) If  $y = x^m$  then  $y_n = \underline{\hspace{2cm}}$  if  $n > m$ .
- a) 0  
 b)  $m! x^{m-n}(m-n)!$   
 c)  $\frac{m! x^m}{(m-n)!}$   
 d)  $m!$
- 2) If  $\cos x = a_0 + a_1x + a_2x^2 + \dots$  then the value of  $a_4 = \underline{\hspace{2cm}}$ .
- a) 0  
 b)  $\frac{1}{2!}$   
 c)  $\frac{1}{3!}$   
 d)  $\frac{1}{4!}$
- 3) An expression in  $x$  and  $y$  is said to be homogenous if sum of the degrees of  $x$  and  $y$  in every term is  $\underline{\hspace{2cm}}$ .
- a) Distinct  
 b) Same  
 c) Finite  
 d) Both a and b
- 4) If  $u = x^3 - 3xy^2$ ;  $v = 3x^2y - y^3$ ; then  $\frac{\partial u}{\partial y} + \frac{\partial v}{\partial x} = \underline{\hspace{2cm}}$ .
- a) 0  
 b) 1  
 c)  $x$   
 d)  $y$
- 5) The reduction formula for  $\int_0^{\frac{\pi}{2}} \sin^n x \, dx$  if  $n$  is even, is  $\underline{\hspace{2cm}}$ .
- a)  $\frac{n-1}{n} \frac{n-3}{n-2} \frac{n-5}{n-4} \dots \frac{2}{3} \cdot 1$   
 b)  $\frac{n-1}{n} \frac{n-3}{n-2} \frac{n-5}{n-4} \dots \frac{3}{4} \frac{1}{2} \frac{\pi}{2}$   
 c)  $\frac{n-1}{n} \frac{n-3}{n-2} \frac{n-5}{n-4} \dots \frac{2}{3} \frac{\pi}{2}$   
 d)  $\frac{n-1}{n} \frac{n-3}{n-2} \frac{n-5}{n-4} \dots \frac{3}{4} \frac{1}{2} \cdot 1$
- 6) The value of  $\int_0^{\frac{\pi}{2}} \cos^7 x \, dx$  is  $\underline{\hspace{2cm}}$ .
- a)  $\frac{16\pi}{35}$   
 b)  $\frac{8\pi}{35}$   
 c)  $\frac{16}{35}$   
 d)  $\frac{8}{35}$
- 7) If  $\vec{f}$  is vector point function then  $\vec{f}$  is called irrotational if  $\underline{\hspace{2cm}}$ .
- a)  $\nabla \cdot \vec{f} = 0$   
 b)  $\nabla \cdot \vec{f} = -1$   
 c)  $\nabla \cdot \vec{f} = 1$   
 d)  $\nabla \times \vec{f} = 0$





- Q.3 Write short notes on any two of the following** **08**
- a) Write systematic position of Yeast.
  - b) Describe the antheridium of *Riccia*.
  - c) Explain the anatomical features of *Cycas* leaflet.
- Q.4 Answer any Two of the following** **08**
- a) Enlist the general characters of Gymnosperms.
  - b) Explain the economic importance of bryophytes.
  - c) Describe the life cycle of *Mucor*.
- Q.5 Answer any one of the following** **08**
- a) Describe in detail life cycle of *Selaginella*.
  - b) Describe in detail life cycle of *Cycas*.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023  
ELECTRONICS (Paper – I)**

**Basic Circuit Theory and Network Analysis (19201118)**

Day & Date: Thursday, 27-07-2023  
Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

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

08

- 1) Series resonance circuit is also known as \_\_\_\_\_ circuit.
  - a) Acceptor
  - b) Rejector
  - c) high pas filter
  - d) low pass filter
- 2) The residential mains supply has \_\_\_\_\_ frequency.
  - a) 230Hz
  - b) 440Hz
  - c) 50Hz
  - d) 100Hz
- 3) In case of pure inductor current \_\_\_\_\_ the voltage.
  - a) lags
  - b) leads
  - c) in phase with
  - d) None of these
- 4) The series and shunt arms of T network for impedance matching are having \_\_\_\_\_.
  - a) inductive reactance only
  - b) inverse reactance of each other
  - c) capacitive reactance only
  - d) None of these
- 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) In parallel resonance circuit impedance at resonance frequency is \_\_\_\_\_.
  - a) minimum
  - b) maximum
  - c) remains same
  - d) changing
- 7) The unit of resistance is \_\_\_\_\_.
  - a) Ohm
  - b) Mhos
  - c) Henry
  - d) Farad
- 8) A sinusoidal signal has period of 5 ms, its frequency is \_\_\_\_\_ Hz.
  - a) 200
  - b) 2
  - c) 20
  - d) 0.2 k

- Q.2 Answer any four of the following. 08**
- a) Define quality factor and selectivity of resonance circuit.
  - b) What is two port networks?
  - c) Define Kirchoff's voltage and current law.
  - d) What is frequency of direct current source?
  - e) Give the classification of Inductor.
- Q.3 Write short note on any two of the following. 08**
- a) Active and passive network.
  - b) Milliman's theorem.
  - c) Impedance parameter.
- Q.4 Answer any Two of the following. 08**
- a) Explain superposition theorem with suitable network.
  - b) Explain mesh analysis for de resistive circuit.
  - c) derive conversion formulae to convert  $\Pi$  to T network.
- Q.5 Answer any one of the following. 08**
- a) Explain types of sinusoidal and non-sinusoidal current and voltage sources.  
Define
    - i) Time period
    - ii) RMS value
  - b) Derive short circuit parameters for two port network and draw its equivalent circuit by using them.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper - I)**  
**Geomorphology - I (19201124)**

Day & Date: Thursday, 27-07-2023  
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

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

**08**

- 1) \_\_\_\_\_ is the branch of science that dealt the evolution of landforms and their distribution on the earth surface.
  - a) Climatology
  - b) Geomorphology
  - c) Biogeography
  - d) Oceanography
- 2) Whenever the two compressive forces applies equal and regularly with same magnitude and intensity, then both limbs of folds equally inclined to each other with constant slope and it is known is \_\_\_\_\_ folds.
  - a) asymmetrical
  - b) symmetrical
  - c) monoclinial
  - d) isoclinal
- 3) Etna & Stromboli volcanoes near the Mediterranean Sea are the examples of \_\_\_\_\_ volcanoes.
  - a) active
  - b) dormant
  - c) extinct
  - d) none of them
- 4) Folded mountain and sea trenches have had been formed at the \_\_\_\_\_ boundary of plates.
  - a) divergent
  - b) transform
  - c) convergent
  - d) none of them
- 5) The \_\_\_\_\_ discontinuity is found in between SIAL and SIMA.
  - a) Mohovisic
  - b) Conrad
  - c) Guttenberg
  - d) None of them
- 6) A \_\_\_\_\_ fault is one in which the hanging wall moves downward in comparison with the adjoining footwall along the fault line.
  - a) normal
  - b) reverse
  - c) lateral
  - d) step
- 7) It is believed that all tectonic movements like earthquakes and volcanoes and earth movements originates from \_\_\_\_\_.
  - a) inner mantle
  - b) outer mantle
  - c) inner core
  - d) outer core
- 8) The rock which is formed by cooling and solidifying of the molten material is known as \_\_\_\_\_ rocks.
  - a) igneous
  - b) metamorphic
  - c) stratified
  - d) none of them

- Q.2 Answer of the following any four.** **08**
- a) Characteristics of metamorphic rocks.
  - b) Give the names of sedimentary rock types.
  - c) Characteristics of secondary waves.
  - d) Interior temperature.
  - e) Examples of metamorphic rocks.
  - f) Types of Earth Movement.
- Q.3 Write a short note on any two of the following.** **08**
- a) Describe the types of fold.
  - b) Describe the world distribution of volcanoes.
  - c) Importance of geomorphology.
- Q.4 Answer any two of the following.** **08**
- a) State the causes of earthquakes.
  - b) State the various of plate boundaries.
  - c) Process of sedimentary rock formation.
- Q.5 Answer any one of the following.** **08**
- a) Describe the scientific classification of interior earth.
  - b) Describe the igneous rocks.





- Q.3 Write short notes on any two of the following. 08**
- a) Earthquake waves.
  - b) Products of volcano.
  - c) Seismograph.
- Q.4 Attempt any two of the following. 08**
- a) Explain the nebular hypothesis.
  - b) Describe central type of volcanoes.
  - c) Intensity and magnitude of Earthquake.
- Q.5 Answer any one of the following. 08**
- a) Describe types of weathering.
  - b) Describe the earth interior.



- Q.3 Write short notes on any two of the following.** **08**
- a) Write a note on 8421 code.
  - b) Write a note on IC 7402.
  - c) Write a note on 4-bit binary adder.
- Q.4 Answer any two of the following.** **08**
- a) Use Karnaugh map to minimize the following Boolean expression-  
$$A\bar{B}C + \bar{A}BC + \bar{A}\bar{B}C + \bar{A}\bar{B}\bar{C} + A\bar{B}\bar{C}$$
  - b) Simplify the following Boolean expression to obtain  
$$\overline{AB + AC} + \bar{A}\bar{B}C = \bar{A} + \bar{B}\bar{C}$$
  - c) Prove the universality of NOR gate.
- Q.5 Answer any one of the following.** **08**
- a) Explain the logic gates AND, OR, NOT and XOR.
  - b) Explain in detail a full adder circuit.

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper - II)**  
**Geomorphology - II (19201125)**

Day & Date: Friday, 28-07-2023  
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ weathering is more dominant in hot desert region.
  - a) Physical
  - b) Chemical
  - c) Biological
  - d) Erosional
- 2) Landscape is a function of structure, process and \_\_\_\_\_.
  - a) Deposition
  - b) Erosion
  - c) Weathering
  - d) Time
- 3) Frost weathering is more common in \_\_\_\_\_ areas.
  - a) Cold
  - b) Hot
  - c) Temperature
  - d) Equatorial
- 4) Beaches are the depositional landforms made by \_\_\_\_\_.
  - a) Glaciers
  - b) Winds
  - c) Oceanic waves
  - d) none of these
- 5) \_\_\_\_\_ is formed by the depositional work of wind.
  - a) V shape valley
  - b) Mashroom rock
  - c) Barkhans
  - d) None of these
- 6) \_\_\_\_\_ is erosional landform of Glaciers.
  - a) Mashroom rock
  - b) U shaped Valley
  - c) Ox-Bow-Lake
  - d) Flood plains
- 7) \_\_\_\_\_ is erosional landform of river.
  - a) Yardang
  - b) Kettles
  - c) Sand Dunes
  - d) Waterfall
- 8) \_\_\_\_\_ has postulated the concept of 'cycle of erosion'.
  - a) R.A. Ray
  - b) Charles Darwin
  - c) W.M. Davis
  - d) A. Wegener

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

**08**

- a) What is weathering?
- b) What is waterfall?
- c) What is Geomorphic process?
- d) What is Fluvial?
- e) What is Barkhan?
- f) What is Glacier?

- Q.3 Write a short note on any two of the following. 08**
- a) V shaped Valley.
  - b) Slow Movement.
  - c) Doline.
- Q.4 Answer any two of the following. 08**
- a) Explain the agents of weathering?
  - b) Causes of Mass Wasting?
  - c) Explain the Circqe and U-Shaped Valley?
- Q.5 Answer any one of the following. 08**
- a) Explain the erosional landform of Rivers?
  - b) Explain the depositional landforms of Sea Coast?

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**B.Sc. (Semester - I) (Old) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Paper - II)**  
**Structural Geology (19201111)**

Day & Date: Friday, 28-07-2023  
 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.  
 3) Draw neat & well labeled diagram wherever necessary.

**Q.1 Multiple choice questions.**

**08**

- 1) Basalt commonly shows presence of \_\_\_\_\_ Joints.
  - a) Strike
  - b) Inlier
  - c) Columnar
  - d) Bedding
- 2) Himalaya is best example of \_\_\_\_\_.
  - a) Fold
  - b) Fault
  - c) Joints
  - d) Outcrop
- 3) Cracks in the rocks along which no displacement takes place are called as \_\_\_\_\_.
  - a) Faults
  - b) Joints
  - c) Folds
  - d) Unconformity
- 4) Joints are formed in \_\_\_\_\_ rocks.
  - a) Igneous
  - b) Sedimentary
  - c) Metamorphic
  - d) all types
- 5) Which of the following is not type of Fault?
  - a) Graben
  - b) Overturned
  - c) Horstd
  - d) Reverse
- 6) Syncline fold is \_\_\_\_\_ upward.
  - a) Convex
  - b) Concave
  - c) Inclined
  - d) None of the above
- 7) Which of the following is TRUE for Recumbent fold?
  - a) horizontal axial plane
  - b) presence of hard core
  - c) reversed limbs
  - d) All the above
- 8) Which of the following represents maximum inclination?
  - a) Aparent dip
  - b) True dip
  - c) Strike
  - d) All the above

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

**08**

- a) Define Fold.
- b) Draw labelled diagram of Diagonal/Oblique Joints.
- c) What is strike?
- d) Define Outcrop.
- e) Give the name of instrument used to determine attitude of rocks.
- f) Define Dip angle.

- Q.3 Write short notes on any two of the following. 08**
- a) Outlier and Inlier.
  - b) Columnar Joints.
  - c) Elements of Faults.
- Q.4 Answer any two of the following. 08**
- a) Describe Symmetrical and Asymmetrical folds.
  - b) Explain Strike and Dip Joints.
  - c) Describe Axial plane and Limbs of fold.
- Q.5 Answer any one of the following. 08**
- a) Define Fault. Describe any three types of Faults.
  - b) Define Unconformity. Describe Angular and Non-conformity.





- Q.2 Write the answers in short. (Any Four)** **12**
- a) What opinion does the author have of the education system of his time?
  - b) What is the true sense of freedom?
  - c) Discuss the theme of the poem – ‘Our Earth Will Not Die’ in your words.
  - d) Why is the poet giving so much emphasis on solitude in the poem and what does it mean to him?
  - e) Discuss the tone of compassion used by the poet in the poem - Remember?
  - f) What kind of people can achieve the true essence of freedom?
- Q.3 Answer the following questions. (Any One)** **10**
- a) Write a letter to your father requesting him to send 5000/- as your class trip is going on to visit South India. Mention the details of four tour and places to visit.
  - b) Write a formal letter to your college librarian as you lost your library card. Request him also to issue a duplicate library card to you. Mention all details of yourself like Name, Class, Roll No and how you lost the card.
- Q.4 What is interpersonal intelligence? Write a detailed note on interpersonal intelligence and how to improve them.** **10**





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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper-III)**  
**Introduction to Web Designing (22221229)**

Day & Date: Wednesday, 21-06-2023  
 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.

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

**08**

- 1) All HTML tags are enclosed in what?
  - a) # and #
  - b) ? and ?
  - c) { and }
  - d) < and >
- 2) The tag for the table row is \_\_\_\_\_.
  - a) <tr>
  - b) <td>
  - c) <tablerow>
  - d) <trows>
- 3) Which of the following is a singular tag?
  - a) <br>
  - b) <i>
  - c) <b>
  - d) <u>
- 4) Class attribute is followed by \_\_\_\_\_ sign.
  - a) @
  - b) &
  - c) #
  - d) .
- 5) Which one of the following is a form element?
  - a) text box
  - b) radio button
  - c) submit button
  - d) All of these
- 6) What does CSS stand for?
  - a) Creative Style Sheets
  - b) Cascading Style Sheets
  - c) Colorful Style Sheets
  - d) Computer Style Sheets
- 7) The default character encoding in HTML5 is \_\_\_\_\_.
  - a) UTF-16
  - b) UTF-32
  - c) UTF-8
  - d) ISO-8859-1
- 8) The declaration in CSS consists \_\_\_\_\_.
  - a) selector
  - b) property
  - c) values
  - d) all of these

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

**08**

- a) What is floating?
- b) Write any four paired tag?
- c) Define selector.
- d) Explain date function in JavaScript.
- e) What is HTML?

- Q.3 Write short notes on any two of the following. 08**
- a) Types of CSS selectors
  - b) image Tag
  - c) Frameset tag in HTML
- Q.4 Answers any two of the following. 08**
- a) Explain box model with example.
  - b) Explain for loop and while loop with example in JavaScript.
  - c) Explain border properties with example.
- Q.5 Answers any one of the following. 08**
- a) Write the advantages of CSS.
  - b) Explain table tag and its attributes with example in HTML.

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Paper - IV)**  
**Analytical Chemistry (22221209)**

Day & Date: Thursday, 22-06-2023  
 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 log table or calculator is allowed.

**Q.1 Choose the correct alternative from the option.**

**08**

- 1) The adulterants in chilli powder is \_\_\_\_\_.  
 a) red brick powder                      b) saw dust  
 c) dung                                        d) all of these
- 2) For determination of Sulphur by sodium fusion test \_\_\_\_\_ colour indicates presence of Sulphur.  
 a) green                                        b) blue  
 c) purple                                        d) red
- 3) The Abbe's refractometer works on \_\_\_\_\_ principle.  
 a) refraction                                b) critical angle  
 c) angle                                        d) all
- 4) \_\_\_\_\_ gas is used for preservation of chips.  
 a) Nitrogen                                b) Oxygen  
 c) Hydrogen                                d) Ammonia
- 5) NaOH is \_\_\_\_\_ acid base.  
 a) di    b) tri  
 c) mono                                        d) tetra
- 6) The application of paper chromatography are \_\_\_\_\_.  
 a) the process is rapid                      b) it requires less time  
 c) require less sample                      d) all of these
- 7) The compound containing 42% C, 12% H, the % of oxygen is \_\_\_\_\_.  
 a) 46    b) 42  
 c) 12    d) 100
- 8) Molecular volume of liquid when its surface tension is unity is called \_\_\_\_\_.  
 a) molal volume                                b) parachor  
 c) viscosity                                      d) density

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

**08**

- a) Write classification of chromatography.
- b) Draw neat labelled diagram of Kjeldahl's method for estimation of nitrogen.
- c) Define standard solution & indicator.
- d) Write equation to calculate specific refraction & molecular refraction.
- e) Write two molecules whose dipole moment is zero.
- f) Name the adulterants in pulses.

- Q.3 Write short notes on any Two.** **08**
- a) Determination of viscosity by Ostwald viscometer
  - b) Mole fraction & weight fraction
  - c) Four chemical methods for food preservation
- Q.4 Answer the any two of following.** **08**
- a) Define equivalent weight what weight of  $\text{Na}_2\text{CO}_3$  is required for preparing  $250 \text{ cm}^3$  of its  $\frac{N}{10}$  solution.
  - b) Write experimental procedure for paper chromatography.
  - c) How will you identify starch & urea as adulterants in milk? How will you identify yellow colour saw dust & metanil yellow as adulterants in turmeric powder?
- Q.5 Answer any one of following.** **08**
- a) Explain the process for detection & calculation of percentage of carbon & hydrogen by Liebig's combustion method.
  - b) How will you determine surface tension of liquid by Drop - weight method? Give its advantages.





- Q.3 Solve any Two.** **08**
- a) Define Scheduler with its 3 types.
  - b) Write a note on Overlays.
  - c) Write note on Critical Section Problem.
- Q.4 Solve any Two.** **08**
- a) Explain Process States Diagram.
  - b) Explain Segmentation.
  - c) State Four necessary conditions to occur Deadlock.
- Q.5 Solve any One.** **08**
- a) Define Operating System? Explain any four types of Operating System.
  - b) Define Threads and Explain types of Threads in detail.

Seat No.	
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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**PHYSICS (Paper - III)**  
**Heat and Thermodynamics (22221205)**

Day & Date: Saturday, 01-07-2023  
 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 table and calculator is allowed.

**Q.1 Choose correct alternative.**

**08**

- 1) Diesel cycle is also known as \_\_\_\_\_.  
 a) constant volume cycle                      b) constant pressure cycle  
 c) constant temperature cycle                d) none of the above
- 2) Coefficient of thermal conductivity depends on temperature as \_\_\_\_\_.  
 a)  $k \propto \sqrt{T}$                                       b)  $k \propto T$   
 c)  $k \propto T^2$                                         d)  $k \propto \frac{1}{T}$
- 3) In Linde's air liquefier, the air is passed through the KOH solution to remove \_\_\_\_\_ from air.  
 a) dust    b) smell  
 c) minerals    d) CO<sub>2</sub> gas and water vapour
- 4) If the systems A and B are in thermal equilibrium with each other then \_\_\_\_\_.  
 a)  $\frac{T_A}{T_B} = 1$                                         b)  $\frac{T_A}{T_B} = 0$   
 c)  $T_A \times T_B > 1$                                 d)  $T_A \times T_B < 1$
- 5) As the temperature of a gas increases, mean free path of gas molecules \_\_\_\_\_.  
 a) decreases    b) remains constant  
 c) increases    d) none of these
- 6) The efficiency of Carnot's engine working between steam point and ice point is \_\_\_\_\_.  
 a) 1    b) 0  
 c) 26.81%    d) 16.81%
- 7) Entropy of reversible process is \_\_\_\_\_.  
 a) increases    b) decreases  
 c) remains constant                                d) zero
- 8) In refrigerator, heat is extracted from \_\_\_\_\_ and delivered to \_\_\_\_\_.  
 a) sink and source                                      b) source and sink  
 c) atmosphere and sink                              d) atmosphere and source

- Q.2 Solve Any Four** **08**
- 1) The diameter of nitrogen molecule is  $3.2 \times 10^{-10}$  m. The number of molecules at  $0^\circ\text{C}$  and 1 atmospheric pressure is  $2.69 \times 10^{25}$  per  $\text{m}^3$ . Calculate mean free path for nitrogen molecules.
  - 2) What is Joule-Thomson effect?
  - 3) What is fountain effect of liquid He II?
  - 4) Give principle of air conditioning system.
  - 5) Name different parts of Carnot's ideal heat engine.
- Q.3 Write short notes on Two of the following.** **08**
- 1) Transport phenomena
  - 2) With a neat labelled diagram explain construction of vapour compression refrigeration system.
  - 3) Experimental set up for adiabatic demagnetisation of paramagnetic substance.
- Q.4 Answer any Two of the following.** **08**
- 1) Obtain an expression for coefficient of viscosity of gas.
  - 2) Derive an expression for the work done in isothermal process.
  - 3) A Carnot's refrigerator takes heat from water at  $0^\circ\text{C}$  and discard it to a room temperature at  $27^\circ\text{C}$ . 1 kg of water at  $0^\circ\text{C}$  is to be changed into ice at  $0^\circ\text{C}$ . Calculate:
    - a) How many calories of heat are discarded to the room?
    - b) What is the work done by the refrigerator in this process?
    - c) What is the coefficient of performance of the machine?(Given: latent heat of ice = 80 cal/gm)
- Q.5 Answer any One of the following.** **08**
- 1) What is Otto cycle? Explain its operation and derive an expression for efficiency of Otto engine.
  - 2) Define adiabatic process. Show that  $PV^\gamma = \text{constant}$  for adiabatic process.

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Paper-III)**  
**Microbial Metabolism and Cultivation (22221220)**

Day & Date: Sunday, 02-07-2023  
 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.  
 (At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ is the general formula of Carbohydrates.
  - a)  $(C_4H_2O)_n$
  - b)  $(C_6H_2O)_n$
  - c)  $(CH_2O)_n$
  - d)  $(C_2H_2O)_n COOH$
- 2) Sucrose is a disaccharide of composed from \_\_\_\_\_.
  - a) Glucose- Glucose
  - b) Glucose-fructose
  - c) Glucose galactose
  - d) none of the above
- 3) \_\_\_\_\_ is the major storage form of carbohydrates in animals.
  - a) Starch
  - b) Chitin
  - c) Glycogen
  - d) Cellulose
- 4) The bond between amino acids in proteins is called as \_\_\_\_\_.
  - a) Ionic bond
  - b) Acidic bond
  - c) Peptide bond
  - d) Hydrogen bond
- 5) \_\_\_\_\_ Protein is present in the milk.
  - a) Casein
  - b) gelatin
  - c) keratin
  - d) Hemoglobin
- 6)  $\alpha$ -helix are present in \_\_\_\_\_ structure of protein.
  - a) Primary
  - b) Secondary
  - c) Tertiary
  - d) Quaternary
- 7) \_\_\_\_\_ bacteria which uses  $CO_2$  as a sole source of carbon and light as source of energy for growth.
  - a) Organotrophs
  - b) Heterotrophs
  - c) Photoautotrophs
  - d) Lithotrophs
- 8) Active site of the enzyme is chemically composed of \_\_\_\_\_.
  - a) Amino acids
  - b) Nucleotides
  - c) Carbohydrates
  - d) None of the above

- Q.2 Answer any Four of following.** **08**
- 1) Define Apo-enzyme and co-enzyme.
  - 2) Give 4 examples of polysaccharides.
  - 3) What is the Second law of thermodynamics?
  - 4) Write a note on inducible enzymes.
  - 5) Give two examples of synthetic media.
- Q.3 Write short note on any Two of the following.** **08**
- 1) Explain what is induced fit hypothesis for enzyme action.
  - 2) Discuss in brief structural level of classification of protein.
  - 3) What is the fate of pyruvate in anaerobic condition?
- Q.4 Answer any Two of following.** **08**
- 1) Write a note on structure of ATP.
  - 2) Structure of DNA.
  - 3) Write a note on Nutritional requirements of Micro-organisms with special emphasis on Carbon source.
- Q.5 Answer any One of following.** **08**
- 1) Write a detailed account on methods of pure culture.
  - 2) Write detailed account of EMP pathway.



- Q.2 Answer any Four of the following. 08**
- 1) Define time constant of RC circuit.
  - 2) State Biot-Savarts law.
  - 3) Define Figure of merit.
  - 4) Define ripple factor.
  - 5) Find the value of current amplification factor  $\alpha$  if  $\beta = 95$
- Q.3 Write short notes on any Two of the following. 08**
- 1) Owens Bridge.
  - 2) Damping in B.G. and its correction.
  - 3) Series L – C – R circuit is connected to a variable frequency 230 V ac.  $L = 5$  H,  $C = 80\mu\text{f}$ ,  $R = 40\Omega$   
Find: a) Resonant frequency b) Quality factor
- Q.4 Answer any Two of the following. 08**
- 1) Derive an expression for growth of current containing a inductance, a resistor and source of constant e.m.f. E in series.
  - 2) Explain working of CE transistor amplifier.
  - 3) Explain the working of positive and negative clampers.
- Q.5 Answer any One of the following. 08**
- 1) Draw neat labeled diagram of Bridge rectifier and explain its operation with ripple factor and rectification efficiency.
  - 2) Explain construction, theory and working of Ballistic Galvanometer.



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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Paper – IV)**  
**Applied Microbiology (22221221)**

Day & Date: Tuesday, 04-07-2023  
 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.

**Q.1 Rewrite the sentences by choosing correct alternative.**

**08**

- 1) Indole production is detected by \_\_\_\_\_ reagent.
 

a) $\alpha$ Naphthol	b) Kovac's
c) Methyl red	d) 40% KOH
- 2) An individual carrying a pathogen without showing symptoms is known as \_\_\_\_\_.
 

a) Vector	b) Fomite
c) Carrier	d) Vehicle
- 3) Solid material settled at bottom during sewage treatment is called \_\_\_\_\_.
 

a) Sediment	b) Floccs
c) Sludge	d) Precipitate
- 4) \_\_\_\_\_ determines strength of sewage.
 

a) MPN	b) MBRT
c) SPC	d) BOD
- 5) \_\_\_\_\_ organism produces dark centered green metallic sheen producing colonies.
 

a) <i>E. coli</i>	b) <i>Clostridium</i>
c) <i>Enterobacter aerogenes</i>	d) <i>Bacillus cereus</i>
- 6) The infection transmitted from mother to baby via placenta is called as \_\_\_\_\_.
 

a) Iatrogenic	b) cross infection
c) Congenital	d) Mixed infection
- 7) Differentiation of *E. coli* from *Enterobacter* is carried out by \_\_\_\_\_ test.
 

a) MPN	b) IMVIC
c) Phosphatase	d) SPC
- 8) Disease causing ability of organism is called \_\_\_\_\_.
 

a) Virulence	b) Etiology
c) Mortality	d) Pathogenicity

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

**08**

- a) Define B.O.D.
- b) Define Opportunistic pathogen.
- c) Composition of sewage. Types of sewage.
- d) Define Incubation period.
- e) Define coliforms with two examples.

- Q.3 Write short notes on any two of the following. 08**
- a) Define carrier and explain different carriers.
  - b) IMViC test
  - c) Presumptive and confirmed test
- Q.4 Answer any Two of the following. 08**
- a) Municipal water purification process.
  - b) Define faecal pollution and enlist and explain indicators of faecal pollution.
  - c) Explain different types of infections.
- Q.5 Answer any one of the following. 08**
- a) Describe various modes of transmission of diseases in detail.
  - b) Write on secondary and tertiary treatment of sewage.



- 8) Which index number is called as ideal index number?
- |             |                      |
|-------------|----------------------|
| a) Lasperys | b) Paasches          |
| c) Fisher   | d) None of the above |

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

- Define Spearman's rank correlation coefficient and state the limits of R.
- Prove that  $Corr(X, X) = 1$ .
- Define the two regression coefficients.
- Given  $Cov(X, Y) = -15$  S. D. of  $X$  and  $Y$  are 11 and 7 respectively. Find  $b_{yx}$ .
- Define Paasche's quantity index numbers.

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

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

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

- Prove that correlation coefficient lies between  $-1$  and  $+1$ .
- The equations of two regression lines are  $8X - 10Y + 66 = 0$  and  $40X - 18Y - 214 = 0$  Find
  - Means of  $X$  and  $Y$
  - Coefficient of correlation between  $X$  and  $Y$ .
- Write a short note on index number.

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

- What is time reversal test of consistency? Verify the same for Laspeyre's index number.
- Obtain the expression for the acute angle  $\theta$  between the two regression lines. Interpret the results  $\theta = 0, \theta = \frac{\pi}{2}$ .



- Q.3 Write short notes on any two of the following.** **08**
- 1) Explain heart of scolidon and compare it with heart of frog.
  - 2) Describe pronephros.
  - 3) Describe brain of frog and compare it brain of rat.
- Q.4 Answer any two of the following.** **08**
- 1) Explain metanephros.
  - 2) Describe pelvic girdle of frog and compare it with pelvic girdle of calotes.
  - 3) Explain digestive system of rat.
- Q.5 Attempt any One of the following.** **08**
- 1) Describe skin of frog.
  - 2) Explain heart of rat.







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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023  
ZOOLOGY (Paper – IV)**

**Developmental Biology of Vertebrates (22221233)**

Day & Date: Saturday, 08-07-2023  
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.

**Q.1 Multiple choice Questions.**

**08**

- 1) Fertilization in human takes place in \_\_\_\_\_.  
a) fallopian tube                      b) ovary  
c) vagina                                d) uterus
- 2) Formation of male gamete is known as \_\_\_\_\_.  
a) oogenesis                              b) fertilization  
c) gastrulation                          d) spermatogenesis
- 3) Species-specific reaction of sperm & egg is takes place in zona pellucida.  
In which receptor.  
a) ZP-1                                      b) ZP-2  
c) ZP-3                                      d) ZP-4
- 4) Egg of Hen is of \_\_\_\_\_.  
a) Alecithal                                b) Polylecithal  
c) Mesolecithal                          d) Microlecithal
- 5) Overgrowth of micromeres on megamers is known as \_\_\_\_\_.  
a) Emboly                                  b) Epiboly  
c) Invagination                          d) Involution
- 6) Structural changes take place during development is called as \_\_\_\_\_.  
a) Spermatomorphosis                b) Oomorphosis  
c) Metamorphosis                        d) Zygomorphosis
- 7) Identical twins are \_\_\_\_\_.  
a) tetrazygotic                            b) dizygotic  
c) monozygotic                            d) trizygotic
- 8) Programmed cell death is \_\_\_\_\_.  
a) homeoptosis                            b) hetroptosis  
c) guanoptosis                            d) apoptosis

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

**08**

- 1) External and internal fertilization
- 2) Structure of ovum of Human
- 3) Blastulation in chick
- 4) Causes of miscarriages
- 5) Juvenile frog
- 6) Phases of spermatogenesis

- Q.3 Write short notes on any TWO of the following. 08**
- 1) Give significance of apoptosis
  - 2) Oogenesis
  - 3) Structure of Hen egg
- Q.4 Answer any TWO of the following. 08**
- 1) Principles of ultrasound
  - 2) Cleavage in chick
  - 3) Describe hormonal regulation of metamorphosis in tadpole.
- Q.5 Answer any ONE of the following. 08**
- 1) Define placenta. Describe types of placenta on the basis of Histology.
  - 2) Explain types of twins in human.

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Paper-III)**  
**Geometry (22221223)**

Day & Date: Monday, 10-07-2023  
 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 correct alternatives****08**

- 1) The polar point  $(r, 0)$  lies on \_\_\_\_\_
  - a) X-axis
  - b) Y-axis
  - c) Initial line
  - d) none of these
- 2) The cartesian equation of  $\cos \theta = \sin \theta$  is \_\_\_\_
  - a)  $x - y = 0$
  - b)  $x + y = 0$
  - c)  $\frac{x}{y}$
  - d) none of these
- 3) The polar coordinate  $(5, 30^\circ)$  then its cartesian coordinates is \_\_\_\_\_
  - a)  $(\sqrt{3}, \frac{5}{2})$
  - b)  $(\frac{5\sqrt{3}}{2}, \frac{5}{2})$
  - c)  $(\frac{1}{2}, \frac{5}{2})$
  - d)  $(\frac{5}{2}, \frac{1}{2})$
- 4) The plane  $a_1x + b_1y + c_1z + d_1 = 0$  and  $a_2x + b_2y + c_2z + d_2 = 0$  are perpendicular if \_\_\_\_\_
  - a)  $\frac{a_1}{a_2} + \frac{b_1}{b_2} + \frac{c_1}{c_2} = 0$
  - b)  $\frac{a_1}{a_2} = \frac{b_1}{b_2} = \frac{c_1}{c_2}$
  - c)  $a_1b_1 + a_2b_2 + c_1c_2 = 0$
  - d)  $a_1a_2 + b_1b_2 + c_1c_2 = 0$
- 5) The direction cosine of the normal to the plane  $2x - 3y + 6z = 7$  is \_\_\_\_\_
  - a)  $(\frac{2}{7}, \frac{-3}{7}, \frac{6}{7})$
  - b)  $(\frac{2}{5}, \frac{-3}{5}, \frac{6}{5})$
  - c)  $(2, -3, 6)$
  - d) none of these
- 6) The equation of plane in normal form is \_\_\_\_\_
  - a)  $ax + by + cz + d = 0$
  - b)  $lx + my + nz = p$
  - c)  $\frac{x}{a} + \frac{y}{b} + \frac{z}{c} = 1$
  - d) None of these
- 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 radius of sphere  $x^2 + y^2 + z^2 - 4x - 6y + 8z + 4 = 0$  is \_\_\_\_\_
  - a)  $r = 4$
  - b)  $r = 3$
  - c)  $r = 2$
  - d)  $r = 5$

- Q.2 Solve any four of the following:** **08**
- Find the polar coordinates whose cartesian coordinates is  $(-1, 1)$
  - Find the cartesian coordinates whose polar coordinates is  $(-3, 45^\circ)$
  - Write the formula for relation between direction cosine and direction ratio.
  - Write the equation of the plane passing through three points.
  - Find the equation of sphere whose centre  $(2, 3, 5)$  and radius  $r = 2$
- Q.3 Answer any two of the following.** **08**
- Transform the equation  $x^2 + 4xy + y^2 = a^2$  when axis are rotated through an angle  $\theta = \frac{\pi}{4}$
  - Find the equation of plane in intercept form with figure.
  - Find the equation of tangent plane to the sphere  $x^2 + y^2 + z^2 - 6x - 4y + 10z + 12 = 0$  at point  $(2, -1, -1)$
- Q.4 Answer any two of the following.** **08**
- Explain two types of family of spheres,  $s + \lambda p = 0$ ,  $s + \lambda s = 0$
  - Find the angle between two planes  $2x - y + z = 6$  and  $x + y + 2z = 3$
  - Identify the conic  $16x^2 - 24xy + 9y^2 - 104x - 172y + 44 = 0$
- Q.5 Answer any one of the following.** **08**
- If the axis are rotated through an angle  $\theta$  the equation  $ax^2 + 2hxy + by^2$  transform into  $a(x)^2 + b(y)^2$  then  $\theta = \frac{1}{2} \tan^{-1} \left( \frac{2h}{a-b} \right)$
  - Define tangent plane and find the equation of tangent plane to the given sphere.

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**BOTANY (Paper - III)**  
**Plant Ecology (22221202)**

Day & Date: Tuesday, 11-07-2023  
 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 logarithm table and calculator is allowed.

**Q.1 Multiple Choice Questions.****08**

- 1) \_\_\_\_\_ is the science of relations between organisms and their environment.
  - a) Ecology
  - b) Zoology
  - c) Geology
  - d) Algology
- 2) \_\_\_\_\_ major ecological levels of organizations.
  - a) Eight
  - b) Seven
  - c) Three
  - d) Nine
- 3) The term \_\_\_\_\_ is used for the gaseous envelope.
  - a) weather
  - b) climate
  - c) atmosphere
  - d) temperature
- 4) The study of soil science is called as \_\_\_\_\_.
  - a) Virology
  - b) Biology
  - c) Bacteriology
  - d) Pedology
- 5) The plants which grow in dry condition are called as \_\_\_\_\_.
  - a) Hydrophytes
  - b) Xerophytes
  - c) Epiphytes
  - d) Mesophytes
- 6) The study of plant community is called \_\_\_\_\_.
  - a) phytosociology
  - b) phytomycology
  - c) Phytogeography
  - d) phytohistology
- 7) \_\_\_\_\_ is the structural and functional unit of ecology.
  - a) Communities
  - b) Ecosystem
  - c) Succession
  - d) All of above
- 8) In xerosere, \_\_\_\_\_ stage is replaced by the herb stage.
  - a) Forest
  - b) Moss
  - c) Shrub
  - d) Crustose lichen

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

- a) Define plant ecology.
- b) What is climate?
- c) Define the hydrophyte.
- d) What is edaphic factor?
- e) Define humidity.
- f) What is hydrosere?

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

- a) Wind
- b) Qualitative character of community
- c) Autotrophy

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

**08**

- a) Describe the stages of xerosere studied by you.
- b) Explain the sciophytes and heliophytes.
- c) Write on interaction between the living world.

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

**08**

- a) Explain the origin and soil formation studied by you.
- b) Describe the rainfall in details.

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Paper-IV)**  
**Differential Equations (22221224)**

Day & Date: Wednesday, 12-07-2023  
 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) The solution of the differential equation  $\sqrt{1-x^2}dy + \sqrt{1-y^2}dx = 0$  is \_\_\_\_\_.
- a)  $\sin^{-1}x + \cos^{-1}x = c$                       b)  $\sin^{-1}x + \sin^{-1}y = c$   
 c)  $\cos^{-1}x + \sin^{-1}y = c$                       d)  $(1-x^2)(1-y^2) = c$
- 2) A differential equation  $\frac{dy}{dx} = \frac{f(x,y)}{g(x,y)}$  is said to be homogeneous if degree of every term in  $f(x,y)$  and  $g(x,y)$  is \_\_\_\_\_.
- a) Different    b) One  
 c) Same    d) Finite
- 3) The differential equation  $Mdx + Ndy = 0$  is exact if \_\_\_\_\_.
- a)  $\frac{\partial M}{\partial x} = \frac{\partial N}{\partial y}$     b)  $\frac{\partial^2 M}{\partial x^2} = \frac{\partial^2 N}{\partial y^2}$   
 c)  $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$     d)  $\frac{\partial^2 M}{\partial y^2} = \frac{\partial^2 N}{\partial x^2}$
- 4) The I.F. of the equation  $\frac{dx}{dy} + py = Q$  is \_\_\_\_\_.
- a)  $e^{\int Pdy}$     b)  $e^{\int Pdx}$   
 c)  $e^{-\int Pdx}$     d)  $e^{-\int Pdy}$
- 5) The solution of  $\frac{d^2y}{dx^2} + 4y = 0$  is \_\_\_\_\_.
- a)  $y = c_1e^{-2x} + c_2e^{2x}$     b)  $y = (c_1 + c_2x)e^{2x}$   
 c)  $y = c_1 \cos 2x + c_2 \sin 2x$     d)  $y = (c_1 + c_2x)e^{-2x}$
- 6)  $1/D^2(\sin 2x) =$  \_\_\_\_\_.
- a)  $\frac{-\sin 2x}{4}$     b)  $\frac{\cos 2x}{4}$   
 c)  $\frac{\sin 2x}{4}$     d)  $\frac{-\cos 2x}{4}$
- 7) The value of  $\frac{1}{f(D)}(e^{ax}v) =$  \_\_\_\_\_.
- a)  $e^{ax} \frac{1}{f(D)}V$     b)  $e^{ax} \frac{1}{f(D+a)}V$   
 c)  $e^{ax} \frac{1}{f(D-a)}V$     d) None of these







- Q.3 Write short notes on any Two of the following.** **08**
- a) What is taxonomy? Describe indirect method of identification.
  - b) Write principles of ICBN.
  - c) What are aims of Taxonomy?
- Q.4 Answer the any two of following.** **08**
- a) Write a note on Sir J.C, Bose botanical garden.
  - b) Write a note on vegetative & reproductive characters of family Liliaceae.
  - c) Write a note on types of inflorescences.
- Q.5 Answer any one of following.** **08**
- a) Write a note on Bentham & Hookers system of classification & add a note on merits & demerits.
  - b) What are steps for preparation of herbarium.



- Q.3 Write short notes on any two of the following.** **08**
- a) Write a note on Varactor diode.
  - b) Write a note on intrinsic and extrinsic semiconductor.
  - c) Write a note on tunnel diode with the help of I-V characteristics.
- Q.4 Answer any Two of the following.** **08**
- a) Explain construction of TRIAC.
  - b) Define  $\alpha$  and  $\beta$  of a transistor. Obtain the relation between them.
  - c) With the help of suitable circuit diagram, explain IV characteristics of PN junction diode.
- Q.5 Answer any one of the following.** **08**
- a) Explain input and output characteristics of a transistor in CE configuration.
  - b) Explain construction & I-V characteristics of D-MOSFET.

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**PHYSICAL GEOGRAPHY (Paper – III)**  
**Human Geography I (22221235)**

Day & Date: Friday, 14-07-2023  
 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 & amp: give equations wherever necessary.  
 4) Use of maps stencil is allowed.

**Q.1 Fill in the blanks by choosing correct alternatives given below.**

**08**

- 1) \_\_\_\_\_ is the Father of Human Geography.
  - a) Carl Ritter
  - b) Blache
  - c) Strabo
  - d) Hartshorne
- 2) The term comes from Anthropogeography, the title of a two-volume work published in 1882 and 1891 by the German geographer \_\_\_\_\_.
  - a) Carl Ritter
  - b) Humbolt
  - c) Strabo
  - d) Friedrich Ratzel
- 3) \_\_\_\_\_ is the largest group according to percentage of population in the world.
  - a) Christianity
  - b) Hinduism
  - c) Judaism
  - d) Islam
- 4) The language families with the most speakers are the \_\_\_\_\_ family.
  - a) Afro-Asiatic
  - b) Indo-European
  - c) Sino-Tibetan
  - d) Austronesia
- 5) Bodh Gaya is a religious site and place of pilgrimage associated with the Mahabodhi Temple Complex in Gaya district in the Indian state of \_\_\_\_\_.
  - a) Bihar
  - b) Maharashtra
  - c) Uttar Pradesh
  - d) West Bengal
- 6) Mecca and Madina are the important holy places of \_\_\_\_\_ religion.
  - a) Christianity
  - b) Hinduism
  - c) Judaism
  - d) Islam
- 7) \_\_\_\_\_ is the a group of people of common ancestry, distinguished from others by physical characteristics, such as hair type, colour of eyes and skin, stature, etc.
  - a) Race
  - b) Religion
  - c) Culture
  - d) Tradition
- 8) There are \_\_\_\_\_ main blood groups in India.
  - a) 6
  - b) 3
  - c) 4
  - d) 5

- Q.2 Answer any four of the following. 08**
- a) What is mean by Anthropogeography?
  - b) Where do the Naga live?
  - c) What are the branches of human geography?
  - d) What are the holy places of Islam?
  - e) What are the physical characteristics (Any two) of Naga Tribe?
- Q.3 Write short notes on any two of the following. 08**
- a) Eskimo Tribe.
  - b) Explain the scope of Human geography.
  - c) Characteristics of Christianity.
- Q.4 Answer any two of the following. 08**
- a) Explain the Mongoloid human race?
  - b) Describe the concept of religion & explain it's various groups in the world?
  - c) Explain the language groups in the world?
- Q.5 Answer any one of the following. 08**
- a) Define the human geography & explain it's importance?
  - b) Explain the racial classification by Griffith Taylor?

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Paper – III)**  
**Structural Geology (22221214)**

Day & Date: Saturday, 15-07-2023  
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

**Q.1 Multiple choice questions:**

**08**

- 1) In \_\_\_\_\_ younger rocks are surrounded by older formations.
 

a) Outlier	b) Inlier
c) Columnar	d) Strike
- 2) Himalaya is best example of \_\_\_\_\_.
 

a) Fold	b) Unconformity
c) Fault	d) Strike
- 3) Which of the following structure represents Geological time gap?
 

a) Faults	b) Joints
c) Folds	d) Unconformity
- 4) Joints are formed in \_\_\_\_\_ rocks.
 

a) Igneous	b) Sedimentary
c) Metamorphic	d) all types
- 5) Which of the following is not type of fault?
 

a) strike- slip	b) step
c) graben	d) columnar
- 6) In isoclinal fold, limbs and axial planes are \_\_\_\_\_.
 

a) convex	b) concave
c) inclined	d) parallel
- 7) Which of the following instrument is used to study attitude of rocks in field?
 

a) Clinometer	b) Brunton compass
c) a & b both	d) contact Goniometer
- 8) True dip represents \_\_\_\_\_ inclination of bed.
 

a) minimum	b) maximum
c) moderate	d) All the above

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

**08**

- 1) Define Joints.
- 2) Draw labelled diagram of Strike Joints.
- 3) What is outcrop?
- 4) Define Structural Geology.
- 5) Draw labelled diagram of clinometer compass.
- 6) Draw labelled diagram of Outlier and Inlier outcrops.

- Q.3 Write short notes on any two of the following. 08**
- 1) Strike & Dip
  - 2) Columnar Joints
  - 3) Recumbent fold
- Q.4 Answer any two of the following. 08**
- 1) Describe Horst and Graben faults.
  - 2) Explain Bedding and Diagonal Joints.
  - 3) Distinguish between Normal and Reverse faults.
- Q.5 Answer any one of the following 08**
- 1) Define Folds. Describe Symmetrical and Asymmetrical Folds.
  - 2) Define Unconformity. Describe Non-conformity and Angular unconformity.



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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS (Paper-IV)**  
**Digital Electronics (22221227)**

Day & Date: Sunday, 16-07-2023  
 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 wherever necessary.  
 4) Use of log table and calculator is allowed.

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

**08**

- 1) In TTL has \_\_\_\_\_ input transistor.
  - a) multi collector
  - b) multi emitter
  - c) multi base
  - d) normal
- 2) Race around condition is observed in \_\_\_\_\_ flip flop.
  - a) R-S
  - b) J-K
  - c) D
  - d) T
- 3) IC 7495 is a \_\_\_\_\_.
  - a) decade counter
  - b) ripple counter
  - c) up-dn counter
  - d) shift register
- 4) In TTL NAND gate sourcing current is \_\_\_\_\_.
  - a) 40 $\mu$ A
  - b) 16mA
  - c) 1.6mA
  - d) 80 $\mu$ A
- 5) J-K flip flop will toggle when J= \_\_\_\_\_ and K= \_\_\_\_\_.
  - a) J=0, K=1
  - b) J=1, K=0
  - c) J=0, K=0
  - d) J=1, K=1
- 6) 8:1 multiplexer has \_\_\_\_\_ control lines
  - a) 8
  - b) 1
  - c) 3
  - d) 2
- 7) Maximum counts for three-bit counter is \_\_\_\_\_.
  - a) 3
  - b) 6
  - c) 8
  - d) 9
- 8) \_\_\_\_\_ common anode seven segment decoder driver
  - a) IC 7447
  - b) IC 7448
  - c) IC 7445
  - d) IC 7440

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

**08**

- a) Draw the diagram of master slave J-K flip flop and give its truth table.
- b) Define propagation delay time in case of TTL NAND gate.
- c) How data is loaded parallelly in shift register?
- d) Give any two differentiating points between multiplexer and demultiplexer.
- e) Draw the timing diagram of MOD 2 counter.
- f) List the types of shift register?

- Q.3 Write Short notes on any two of the following** **08**
- a) MOD 5 counter
  - b) Edge triggered D flip flop
  - c) Noise margin and power dissipation
- Q.4 Answers any two of the following.** **08**
- a) Explain 3 to 8 decoder.
  - b) Explain ring counter with truth table and timing diagram.
  - c) Explain R-S flip flop using NOR gate.
- Q.5 Answers any one of the following.** **08**
- a) Explain 4-bit binary asynchronous counter with its truth table and timing diagram.
  - b) Explain construction and working of TTL NAND gate along with its necessary truth table.



- Q.3 Write a Short notes on any two of the following** **08**
- a) High density population region of the world
  - b) Age and Sex Ratio
  - c) Characteristics of Plantation Agriculture
- Q.4 Answers any two of the following.** **08**
- a) Explain any four functions of rural settlement.
  - b) Demerits of demographic transition theory
  - c) Explain the economic problems of Indian Agriculture.
- Q.5 Answers any one of the following.** **08**
- a) Explain the population distribution of the world.
  - b) Explain the physical factors affecting on agriculture.

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**B.Sc. (Semester - II) (New) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Paper – IV)**  
**Crystallography (22221215)**

Day & Date: Monday, 17-07-2023  
 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 wherever necessary.

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

**08**

- 1) In \_\_\_\_\_ System, all axes are inclined.
  - a) Triclinic
  - b) Hexagonal
  - c) Orthorhombic
  - d) Monoclinic
- 2) Which of the following form belongs to Cubic system?
  - a) Prism
  - b) Pyramid
  - c) Quarter Pyramid
  - d) Octahedron
- 3) In Monoclinic system, \_\_\_\_\_ planes of symmetry present
  - a) 7
  - b) 5
  - c) 1
  - d) 3
- 4) The general formula of Cube is \_\_\_\_\_.
  - a) (100)
  - b) (011)
  - c) (110)
  - d) (111)
- 5) Type mineral of Triclinic system is \_\_\_\_\_.
  - a) Gypsum
  - b) Beryl
  - c) Axinite
  - d) Galena
- 6) Which of the following form cuts all three axes?
  - a) Pyramid
  - b) Prism
  - c) Dodecahedron
  - d) Basal Pinacoid
- 7) Smooth, flat surface of crystal is called as \_\_\_\_\_.
  - a) edge
  - b) solid angle
  - c) face
  - d) interfacial angle
- 8) In Quarter Pyramid \_\_\_\_\_ faces present
  - a) 6
  - b) 8
  - c) 2
  - d) 4

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

**08**

- a) What is a Crystal?
- b) Give Elements of Symmetry of Tetragonal System
- c) Draw labeled diagram of crystallographic axes of Cubic system
- d) Define combined forms of Crystal
- e) What is interfacial angle?
- f) Define Dome

- Q.3 Write a Short notes on any two of the following** **08**
- a) Crystallographic axes of Monoclinic and Triclinic system
  - b) Contact Goniometer
  - c) Pinacoids and types
- Q.4 Answers any two of the following.** **08**
- a) Describe Faces, Solid angle and interfacial angle of crystal with labeled diagram
  - b) Explain Plane and Axes of Symmetry
  - c) Describe Cube & Octahedron
- Q.5 Answers any one of the following.** **08**
- a) Define crystal. Describe Crystallographic axes, Elements of Symmetry and any two forms of Hexagonal System.
  - b) Describe Crystallographic axes, Elements of Symmetry and any two forms of Orthorhombic System.



**Q.3 Answer any one of the following questions. 10**

- a) Describe the process of making a cup of coffee. Use appropriate linking words wherever necessary.
- b) Prepare a presentation on your favourite author. Use following points  
Birth and childhood—education and influences—important books and themes- important events—prizes and recognition — death.

**Q.4 Read the following advertisement and write a letter of application for it 10**

Moderna Hotel  
Requires Receptionist  
Educational qualification: Graduation, diploma in hotel management  
Fluency in Marathi, Hindi and English  
Proficiency in MS- Office  
Experience: 1 year in a three star hotel  
Write to:  
The manager  
Moderna Hotel  
65, Main road  
Solapur-2



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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Paper – III)**  
**ORGANIC CHEMISTRY (19201208)**

Day & Date: Tuesday, 20-06-2023  
 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 table and calculator is allowed.  
 (At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

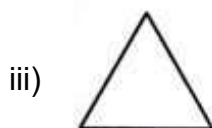
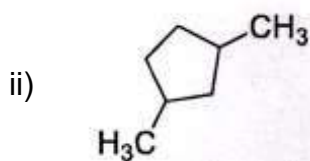
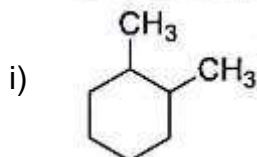
**Q.1 Choose the correct alternative from the option.**

**08**

- Which of the following is the general formula of cycloalkanes?
  - $C_nH_{2n} + 2$
  - $C_nH_{2n}$
  - $C_nH_{2n} - 2$
  - none of the above
- Heterolytic fission of an organic covalent bond gives \_\_\_\_\_.
  - Free radical
  - Only cations
  - Only anions
  - Both cations and anions
- $SP^3$  hybridization leads to which shape of the molecule \_\_\_\_\_.
  - Linear
  - Pyramidal
  - Trigonal
  - Tetrahedral
- Total number of bonds present in  $CH_2=CH_2$  are \_\_\_\_\_.
  - $5\sigma$  and  $1\pi$
  - $3\sigma$  and  $3\pi$
  - $4\sigma$  and  $4\pi$
  - $2\sigma$  and  $4\pi$
- Conjugated double bond compound is \_\_\_\_\_.
  - 1,3 butadiene
  - Butyne
  - Isobutylene
  - Butylenes
- Anti-Markownikoffs addition of HBr is not observed in \_\_\_\_\_.
  - Propene
  - but-1-ene
  - but-2-ene
  - pent-2-ene
- The C-C-C bond angle in Benzene is \_\_\_\_\_.
  - $120^\circ$
  - $180^\circ$
  - $45^\circ$
  - $60^\circ$
- All carbon atoms in benzene are \_\_\_\_\_.
  - $SP^3$  hybridized
  - $SP^2$  hybridized
  - $SP$  hybridized
  - none of the above

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

- 1) What are dienes? Explain isolated, conjugated and cumulated dienes.
- 2) Define and explain following terms.
  - i) Aromatic compound
  - ii) non aromatic compounds
- 3) What are carbanions? Give any two methods of formation of carbanions.
- 4) What are cycloalkanes? Give the method of preparation of cyclopropane.
- 5) Write the IUPAC names of the following.



- 6) What are Geometrical isomers? Explain with example.

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

- 1) What are rearrangement reactions? Explain different types of rearrangement reactions.
- 2) What is resonance effect? Illustrate resonance effect in phenol.
- 3) Give an account of isomerism exhibited by tartaric acid.

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

- 1) What are carbocations? Give any two methods of formation of carbocations.
- 2) What is optical activity? Explain conditions for optical activity.
- 3) Explain and illustrate  $sp^3$ ,  $sp^2$  and  $sp$  hybridization.

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

- 1) What is Friedel-Crafts acylation? Give its mechanism.
- 2) Explain the addition of hydrogen bromide to propene in accordance with
  - i) Markownikoffs rule
  - ii) Anti-Markownikoffs rule

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper-III)**  
**Introduction to Web Designing (19201229)**

Day & Date: Wednesday, 21-06-2023  
 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) \_\_\_\_\_ is the father of HTML.
  - a) Tim Berners-Lee
  - b) Hack on lee
  - c) Tim Thompson
  - d) none of these
- 2) JavaScript is case sensitive language.
  - a) True
  - b) False
- 3) \_\_\_\_\_ HTML tag produces the smallest heading.
  - a) <h6>
  - 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) HTML stands for \_\_\_\_\_.
  - a) Hyper Tech Markup Language
  - b) Hyper Text Markup Language
  - c) Hyper Text Makeup Language
  - d) None of these
- 8) The declaration in CSS consists \_\_\_\_\_.
  - a) selector
  - b) property
  - c) values
  - d) all of these

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

- a) What is internet?
- b) What is singular and paired tag?
- c) Different heading tags.
- d) Explain star topology with diagram.
- e) What is image floating?
- f) Define opacity.

- Q.3 Write short notes on any two of the following.** **08**
- a) Frameset tag
  - b) Anchor Tag
  - c) Media tags in HTML5
- Q.4 Answers any two of the following.** **08**
- a) Explain different types of list in HTML with example.
  - b) Explain for loop and while loop with example in JavaScript.
  - c) Explain different types of computer networking.
- Q.5 Answers any one of the following.** **08**
- a) Explain different types of CSS.
  - b) Explain table tag and its attributes with example in HTML.

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Paper-IV)**  
**Analytical Chemistry (19201209)**

Day & Date: Thursday, 22-06-2023  
 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 log table and calculator is allowed  
 4) Draw neat labelled diagrams must be drawn wherever necessary.

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

- 1) Abbes' refractometer is based on \_\_\_\_\_ principle.
  - a) critical angle
  - b) refraction
  - c) angle
  - d) none of these
- 2) The molecular mass of compound is an example of \_\_\_\_\_ property.
  - a) constitutive
  - b) additive & constitutive
  - c) subtractive
  - d) additive
- 3) Haemoglobin is an \_\_\_\_\_ complex.
  - a) Cobalt
  - b) Iron
  - c) Zinc
  - d) lead
- 4) Hardness of water is measured in \_\_\_\_\_.
  - a) PPM
  - b) amu
  - c) g/cm<sup>3</sup>
  - d) N/m<sup>2</sup>
- 5) In Kjeldah's method \_\_\_\_\_ is used as catalyst.
  - a) CuO
  - b) K<sub>2</sub>SO<sub>4</sub>
  - c) CuSO<sub>4</sub>
  - d) AgNO<sub>3</sub>
- 6) The fusion of sodium with aniline give \_\_\_\_\_.
  - a) NaCN
  - b) Na<sub>2</sub>S
  - c) NaX
  - d) NaCNS
- 7) Natural gas mainly contains highest percentage of \_\_\_\_\_.
  - a) Ethane
  - b) Propane
  - c) Pentane
  - d) Butane
- 8) Paracetamol having \_\_\_\_\_ activity.
  - a) analgesic
  - b) antipyretic
  - c) a & b
  - d) antimaterial

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

- a) Write two advantages of Abbe's refractometer.
- b) Define COD & BOD.
- c) What are type of water pollution?
- d) Draw neat labelled diagram of activated sludge process.
- e) Define molecular formula & empirical formula.
- f) Define knocking. Give one example of compound having ant knocking property.

- Q.3 Write short note on any two.** **08**
- a) Drop weight method to determine surface tension
  - b) Types of water pollution
  - c) Classification of air pollutants
- Q.4 Answer any two of following.** **08**
- a) Explain the dipole moment in the study of molecular structure.
  - b) Explain in detail ion exchange process.
  - c) Explain the process of refining of petroleum.
- Q.5 Answer any one of following.** **08**
- a) What is meant by viscosity & fluidity? Describe the method to determine coefficient of viscosity by Ostwald viscometer.
  - b) Explain Liebig's combustion method to determine percentage of carbon & hydrogen.

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper - IV)**  
**Programming Using C – II (19201230)**

Day & Date: Friday, 23-06-2023  
 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 correct alternative for the following.**

**08**

- 1) In case of call by \_\_\_\_\_, operation performed on formal parameter affects on actual parameter.
 

a) Value	b) Pointer
c) Address	d) Both b and c
- 2) Assessing structure members using \_\_\_\_\_ operators.
 

a) .	b) ->
c) Both a and b	d) None of these
- 3) For dynamic memory allocation \_\_\_\_\_ header file is used.
 

a) dma.h	b) dynamic.h
c) alloc.h	d) runtime.h
- 4) All the members of \_\_\_\_\_ shared common memory location.
 

a) structure	b) union
c) Array	d) Both b & c
- 5) Passing parameters to \_\_\_\_\_ function is called as "command line" arguments.
 

a) main()	b) getch()
c) clrscr()	d) getchar()
- 6) \_\_\_\_\_ keyword is useful to give alternative name for existing data type.
 

a) sizeof	b) int
c) char	d) typedef
- 7) \_\_\_\_\_ is used as a dynamic memory allocation function.
 

a) release()	b) realloc()
c) fprintf()	d) None of these
- 8) \_\_\_\_\_ function is used to write single integer value into file.
 

a) putc()	b) get()
c) putw()	d) getw()

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

**08**

- 1) What is typedef?
- 2) Define macro.
- 3) What are the use of getpixel()?
- 4) Define local and global variables.
- 5) How to declare array?
- 6) What is pointer?

- Q.3 Write short notes on any two of the following.** **08**
- 1) Chain of Pointer
  - 2) Command line argument
  - 3) Nested structure
- Q.4 Answer any Two of the following.** **08**
- 1) Write a program to show concept of recursion.
  - 2) Explain call by value and call by reference in detail.
  - 3) Explain random access of file.
- Q.5 Answer any one of the following.** **08**
- 1) What is dynamic memory allocation? Explain any two functions used in it with program.
  - 2) Write a program to check given number is prime or not using function.



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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**PHYSICS (Paper - III)**  
**Heat and Thermodynamics (19201205)**

Day & Date: Saturday, 01-07-2023  
 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 table and calculator is allowed.

**Q.1 Choose correct alternative.**

**08**

- 1) Diesel cycle is also known as \_\_\_\_\_.
  - a) constant volume cycle
  - b) constant pressure cycle
  - c) constant temperature cycle
  - d) none of the above
- 2) Viscosity of a gas is directly proportional to \_\_\_\_\_.
  - a) T
  - b) P
  - c)  $\sqrt{T}$
  - d)  $T^2$
- 3) In Linde's air liquefier, the air is passed through the KOH solution to remove from air \_\_\_\_\_.
  - a) dust
  - b) Smell
  - c) minerals
  - d) CO<sub>2</sub> gas and water vapour
- 4) First law of thermodynamics introduces the concept of \_\_\_\_\_.
  - a) temperature
  - b) internal energy
  - c) pressure
  - d) entropy
- 5) As the temperature of a gas increases, mean free path of gas molecules \_\_\_\_\_.
  - a) decreases
  - b) remains constant
  - c) increases
  - d) none of these
- 6) The gas which cannot be liquified by Linde's method is \_\_\_\_\_.
  - a) hydrogen
  - b) nitrogen
  - c) oxygen
  - d) carbon dioxide
- 7) Entropy of reversible process \_\_\_\_\_.
  - a) increases
  - b) decreases
  - c) remains constant
  - d) zero
- 8) In refrigerator, heat is extracted from \_\_\_\_\_ and delivered to \_\_\_\_\_.
  - a) sink and source
  - b) source and sink
  - c) atmosphere and sink
  - d) atmosphere and source

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

- 1) Define isothermal process.
- 2) Calculate the coefficient of viscosity of a gas having average velocity of 900m/s. (Density of gas =  $1.5 \text{ kg/m}^3$  and mean free path =  $8 \times 10^{-6}\text{m}$ )
- 3) What is Joule-Thomson effect?
- 4) Define coefficient of performance.
- 5) Find the efficiency of Carnot's engine working between steam point and ice point.
- 6) A certain mass of gas at NTP is expanded to three times its volume under adiabatic conditions. Calculate the resulting pressure,  $\gamma$  for the gas is 1.40.

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

- 1) Reversible and irreversible process with examples.
- 2) Properties of liquid He II.
- 3) Experimental set up for adiabatic demagnetisation of paramagnetic substance.

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

- 1) Obtain an expression for coefficient of thermal conductivity of gas.
- 2) Derive an expression for the work done in adiabatic process.
- 3) What is mean free path? Obtain Clausius expression for mean free path by collision cross section method.

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

- 1) What is Otto cycle? Explain its operation and derive an expression for efficiency of Otto engine.
- 2) With a neat labelled diagram explain construction and working of vapour compression refrigeration system?

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Paper-III)**  
**Microbial Physiology (19201220)**

Day & Date: Sunday, 02-07-2023  
 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 equation wherever necessary.

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ is the example of homopolysaccharide carbohydrate.
  - a) Starch
  - b) Glycogen
  - c) Cellulose
  - d) All of the above
- 2) In B type DNA, the distance of one complete turn is \_\_\_\_\_.
  - a) 30A°
  - b) 20A°
  - c) 34A°
  - d) 35A°
- 3) The nitrogen base having single ring structure is called as \_\_\_\_\_.
  - a) Purine
  - b) Pyrimidine
  - c) Both a and b
  - d) DNA
- 4) Nucleosides are nothing but \_\_\_\_\_.
  - a) Nitrogen base and sugar molecule
  - b) Nitrogen base and Phosphate molecule
  - c) Phosphate and sugar molecule
  - d) Nitrogen base, sugar and Phosphate molecule
- 5) All enzymes are protein but all proteins are not enzymes except \_\_\_\_\_.
  - a) Apoenzyme
  - b) Ribozyme
  - c) Amylase
  - d) RNA polymerase
- 6) Enzymes used for lactose utilization are \_\_\_\_\_ type of enzyme.
  - a) Constitutive
  - b) Inducible
  - c) Isoenzyme
  - d) Apoenzyme
- 7) To adjust or maintain osmotic pressure \_\_\_\_\_ component is added in culture media.
  - a) Agar – Agar
  - b) Vitamin
  - c) NaCl
  - d) Yeast extract
- 8) On hydrolysis of one ATP molecule under standard conditions \_\_\_\_\_ Kcal / mol of energy is released.
  - a) -5.7
  - b) -7.5
  - c) 7.3
  - d) -7.3

- Q.2 Answer any Four of the following. 08**
- 1) Draw the structure of DNA and neat label it.
  - 2) Define coenzyme and give their example.
  - 3) Define Chemoheterotrophs and give two examples of chemoheterotrophic bacteria.
  - 4) Write the importance of peptone in bacteriological media.
  - 5) Define induced enzyme and give their example.
  - 6) Write the importance of Neutral red in bacteriological media.
- Q.3 Write short note on any Two of the following. 08**
- 1) Write note on structure and energy content of ATP.
  - 2) Describe in brief the types and function of lipids.
  - 3) Write in short about importance of Agar - Agar and sodium taurocholate in bacteriological media.
- Q.4 Answer any Two of following. 08**
- 1) Define enzymes and write in short about basic or simple structure of enzyme.
  - 2) Describe in short about nutritional requirements of microorganisms.
  - 3) Write in short about EMP pathway of glucose catabolism.
- Q.5 Answer any One of following. 08**
- 1) Describe in detail about nutritional types of microorganisms based on carbon and energy source.
  - 2) Describe in detail the structure and function of proteins.



- Q.2 Attempt any FOUR of the following** **08**
- 1) Draw the frequency response curve for series LCR Circuit.
  - 2) Define charge sensitivity and voltage sensitivity for ballistic galvanometer.
  - 3) Draw input and output waveforms for positive clamper.
  - 4) What is filter circuit?
  - 5) Calculate the magnetic induction at a centre of a single turn circular coil having radius 3.14 cm and carrying current 2 ampere.
  - 6) Calculate the resonance frequency for series LCR circuit, when circuit consist 100 mH inductor and 10  $\mu$ F capacitor.
- Q.3 Attempt any TWO of the following.** **08**
- 1) Write a short note on: Parallel Resonant Circuit.
  - 2) Describe the circuit of common emitter transistor amplifier.
  - 3) Calculate current flowing through a coil having resistance  $1\Omega$  and inductance 1 henry at time instant 1 second after applying potential difference of 2 V.
- Q.4 Attempt any TWO of the following.** **08**
- 1) What is clipper? Explain the working of Negative Clipper circuit?
  - 2) Derive the relationships between current amplification factors for a transistor connected in CB and CE configurations.
  - 3) In a series LCR circuit  $L = 20$  mH,  $C = 10$   $\mu$ F and  $R = 2\Omega$ .  
Calculate: a) Bandwidth  
b) Quality factor at resonance
- Q.5 Attempt any ONE of the following.** **08**
- 1) Describe charging and discharging modes of a capacitor through an inductor.
  - 2) State Biot-Savart's law and derive an expression for magnetic induction at one end point on the axis of a solenoid carrying current having finite length.



- Q.3 Write short notes on any TWO of the following. 08**
- a) IMViC Test.
  - b) Modes of transmission of diseases.
  - c) Explain the Biological methods for sewage treatment.
- Q.4 Answer any TWO of the following. 08**
- a) MPN test.
  - b) Describe the types of infection.
  - c) Pasteurization methods of Milk.
- Q.5 Answer any ONE of the following. 08**
- a) Describe municipal water purification.
  - b) Give an account of composition of milk and sources of contamination of milk.





- Q.3 Write short note on any two of the following** **08**
- a) Uses of index number.
  - b) Effect of change of origin and scale on correlation coefficient.
  - c) Yules coefficient of association.
- Q.4 Answer any two of the following** **08**
- a) With usual notation, prove that  $R = 1 - \frac{6\sum di^2}{n(n^2-1)}$
  - b) What is time reversal test of consistency? Verify the same for Laspeyre's quantify index number.
  - c) Prove that the correlation coefficient is the geometric mean between the regression coefficients.
- Q.5 Answer any One of the following.** **08**
- a) Derive acute angle between the two regression lines.
  - b) State the conditions of consistency in case of three attributes A, B and C.



- Q.3 Write short notes on any two of the following.** **08**
- 1) Define soft glands of vertebrates.
  - 2) Explain endoskeletons.
  - 3) Define wolffian duct.
- Q.4 Answer any two of the following.** **08**
- 1) Compare the structure of heart of scoliodon with that of *Rana* species.
  - 2) Compare the structure of brain of aves with mammal.
  - 3) Compare the structure of aortic arches of amphibians with reptiles.
- Q.5 Answer any One of the following.** **08**
- 1) Give a comparative account of stomach in different vertebrates.
  - 2) Give a comparative account of respiratory organs of vertebrates.



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

- a) Define expectation of  $X$ .
- b) Define joint probability mass function
- c) Define conditional variance of  $X$  given  $Y = y$ .
- d) Define one point distribution.
- e) Define Binomial distribution.
- f) Define Hyper-geometric distribution.

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

- a) The p.m.f. of a r.v.  $X$  is given by  

$$P(x) = \frac{x}{15} \text{ for } x = 1,2,3,4,5$$
 Find  $E(X)$  and  $E(2X + 3)$
- b) State and prove multiplication theorem on expectation.
- c) Find mean and variance of Bernoulli distribution.

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

- a) With usual notation prove that  $V(aX + b) = a^2V(X)$
- b) The joint pmf of r. v.  $(X, Y)$  is  

$$P(x, y) = \frac{1}{4} \text{ for } x = 1,2, ; y = 1,2$$

$$= 0 \text{ otherwise}$$
 Discuss the independence of  $X$  and  $Y$ .
- c) If the p.g.f. of discrete r. v. is  $0.5 + 0.3S + 0.2S^2$  then find  $E(X)$  and  $V(X)$

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

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

$X \backslash Y$	1	2	3
1	0	$\frac{1}{3}$	0
2	$\frac{1}{3}$	0	$\frac{1}{3}$

Find

- 1) Marginal probability distribution of  $X$  and  $Y$ .
- 2)  $E(X + Y)$
- b) Find mean and variance of Hypergeometric distribution.



- Q.3 Write notes on any Two of the following. 08**
- 1) Give an account on structure of hen's egg.
  - 2) Give a brief account on the principle and applications of ultrasound in human embryology.
  - 3) Define placenta and give explanation on hemochorial placenta.
- Q.4 Attempt the following. 08**
- 1) Explain the process of spermatogenesis.
  - 2) Define apoptosis and give an outline of its mechanism.
- Q.5 Answer any One of the following. 08**
- 1) Discuss the process of cleavage, blastulation and gastrulation in human.
  - 2) Give a detailed account on frog tadpole metamorphosis and its hormonal regulation.





- Q.2 Solve any four of the following:** **08**
- Find the polar co-ordinates whose cartesian co-ordinates is  $(-1, 1)$
  - Find the cartesian equivalents of polar equation  $r = a \cos \theta$
  - Find centre and radius of  $x^2 + y^2 + z^2 - 2x + 4y - 6z = 11$
  - Find the equation of sphere with centre at  $(a, b, c)$  and radius ' $r$ '
  - Show that the three points  $(-2, 3, 5), (1, 2, 3), (7, 0, -1)$  are collinear.
  - Find the equation of plane whose  $x, y, z$  intercept are 3, 4 and 7 respectively
- Q.3 Answer any two of the following.** **08**
- Transform the equation  $x^2 - 4xy + 3y^2 - 10x + 16y + 21 = 0$  to parallel axes through the points  $(1, -2)$
  - Prove that the plane  $Ax + By + Cz = D$  touches the sphere  $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$  if and only if  $(Au + Bv + Cw + D)^2 = (A^2 + B^2 + C^2)(u^2 + v^2 + w^2 - d)$
  - Find equation of plane through the points  $P(2, 2, -1), Q(3, 4, 2)$  and  $R(7, 0, 6)$
- Q.4 Answer any two of the following.** **08**
- If by rotation of axes, the expression  $\alpha x + \beta y$  changes to  $\alpha' x' + \beta' y'$  then show that  $\alpha^2 + \beta^2$  is invariant
  - Find the equation of a tangent plane to the sphere  $x^2 + y^2 + z^2 - 6x - 4y + 10z + 12 = 0$  at  $(2, -1, -1)$
  - Derive equation of plane in normal form.
- Q.5 Answer any one of the following.** **08**
- If by rotation of axes the expression  $ax^2 + 2hxy + by^2$  becomes  $a'x'^2 + 2h'x'y' + b'y'^2$  then prove that  $a + b = a' + b'$  and  $ab - h^2 = a'b' - h'^2$
  - Find  $k$  if  $(2, -1, 1)$  lies on the sphere  $x^2 + y^2 + z^2 + 4x + 2y - 2z - k = 0$
    - Find the equation of the plane through the point  $(1, -3, 2)$  and perpendicular to the planes  $x + 2y + 2z = 5$  and  $3x + 3y + 2z = 8$

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**BOTANY (Paper III)**  
**Plant Ecology (19201202)**

Day & Date: Tuesday, 11-07-2023  
 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) All questions carry equal marks.

**Q.1 Rewrite the following sentences by choosing correct alternative.**

**08**

- 1) \_\_\_\_\_ is the space between the soil particles.
  - a) Bulky density
  - b) Soil permeability
  - c) Soil structure
  - d) Soil porosity
- 2) The plant grows in extremely dry habit are known as \_\_\_\_\_.
  - a) Hydrophytes
  - b) Xerophytes
  - c) Mesophytes
  - d) Oxalophytes
- 3) The poorly developed root system is shown in \_\_\_\_\_.
  - a) Mesophyte
  - b) Hydrophyte
  - c) Xerophytes
  - d) Epiph
- 4) \_\_\_\_\_ succession takes place on rock.
  - a) Hydrosere
  - b) Xerosere
  - c) Lithosere
  - d) None of these
- 5) The plants are called \_\_\_\_\_ of ecosystem.
  - a) Consumer
  - b) Decomposer
  - c) Producers
  - d) Rotifer
- 6) Ecological pyramids are \_\_\_\_\_ in nature.
  - a) Triangular
  - b) Circular
  - c) Quadrangular
  - d) Pentangular
- 7) The term ecosystem was first proposed by \_\_\_\_\_ Ecologist.
  - a) Lawlor - 1931
  - b) A.G. Tansley - 1935
  - c) E.P. Odum - 1963
  - d) Madhavan - 1974
- 8) Vitality of plant community is \_\_\_\_\_ types.
  - a) V<sub>1</sub>
  - b) V<sub>2</sub>
  - c) V<sub>5</sub>
  - d) V<sub>3</sub>

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

**08**

- a) Define the pediology.
- b) Define Food Chain.
- c) What is mean by primary succession?
- d) Give the components of grassland ecosystem.
- e) Give the chemical properties of soil.
- f) Define hydro sere.

- Q.3 Write short notes following questions (any two).** **08**
- 1) What is mean by soil profile?
  - 2) What are the qualitative characters of plant community?
  - 3) Consumers.
- Q.4 Answer the following questions (any two).** **08**
- a) Describe the components of an ecosystem.
  - b) Explain Xerosere.
  - c) Describe the grassland ecosystem.
- Q.5 Answer the following (any one ).** **08**
- a) What is ecological pyramid? Describe pyramid of number in ecosystem.
  - b) What is succession? Describe the various stages of Hydrosere.



8) If the equation  $Mdx + Ndy = 0$  is homogeneous and  $Mx + Ny \neq 0$  then

I.F. = \_\_\_\_\_.

a)  $\frac{1}{Mx + Ny}$

b)  $\frac{1}{My + Nx}$

c)  $\frac{1}{My - Nx}$

d)  $\frac{1}{Mx - Ny}$

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

**08**

a) Solve  $(x^4 - 2xy^2 + y^4)dx - (2x^2y - 4xy^3 + \sin y)dy = 0$

b) Solve  $(x^2 - yx^2)dy + (y^2 + x^2y^2)dx = 0$

c) Solve  $\frac{dy}{dx} - \frac{2x}{1-x^2}y = \frac{1}{(1-x^2)^{3/2}}$

d) Solve  $\frac{dy}{dx} = \frac{x^2+y^2}{2xy}$  by using substitution  $y = vx$

e) Solve  $\frac{d^4y}{dx^4} - 81y = 0$

f) Solve  $(D^3 + 3D + 2)y = 2e^{2x}$

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

**08**

a) Prove that the necessary and sufficient condition that

$Mdx + Ndy = 0$  to be exact is  $\frac{\partial M}{\partial y} = \frac{\partial N}{\partial x}$

b) Show that  $(D - \alpha)(D - \beta)y = (D - \beta)(D - \alpha)y$

c) Solve  $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + y = 2 \sin 3x$

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

**08**

a) Solve  $\frac{dy}{dx} = \frac{y-x+1}{y+x+5}$

b) Solve  $(D^4 - 2D^3 + D^2)y = x^3$

c) The differential equation  $(D - m_1)^2y = 0$ , then show that  $y = (c_1x + c_2)e^{m_1x}$

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

**08**

a) Explain the method of solving  $\frac{dy}{dx} + py = Qy^n$ , and hence solve

$\frac{dy}{dx} - \frac{\tan y}{1+x} = (1+x)e^x \sec y$

b) If  $f(D)y = x$ , where  $x = \sin ax$ ,  $a$  is constant. Prove that

$\frac{1}{f(D^2)} \sin ax = \frac{1}{f(-a^2)} \sin ax$ , where  $f(-a^2) \neq 0$ . Solve that differential

equation  $\frac{d^4y}{dx^4} + 10\frac{d^2y}{dx^2} + 9y = \cos x$

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**BOTANY (PAPER IV)**  
**Taxonomy of Angiosperms (19201203)**

Day & Date: Thursday, 13-07-2023  
 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.

**Q.1 Multiple Choice Questions.**

**08**

- 1) \_\_\_\_\_ are commonly known as group of flowering plants.
  - a) Angiosperms
  - b) Gymnosperms
  - c) Fungi
  - d) Pteridophytes
- 2) The aim of taxonomy includes three aspects \_\_\_\_\_ of plants.
  - a) Identification
  - b) nomenclature
  - c) classification
  - d) all the above
- 3) \_\_\_\_\_ is concerned with the laws governing the classification of plants.
  - a) Taxonomy
  - b) Anatomy
  - c) Both a and b
  - d) None of these
- 4) \_\_\_\_\_ are the two English taxonomists who were closely associated with the Royal Botanical Garden at Kew, England.
  - a) Angler and Hooker
  - b) Bentham and Hooker
  - c) Bentham and Alexopolous
  - d) Mims and Hooker
- 5) A binomial name is comprised of two parts that is \_\_\_\_\_ name.
  - a) generic
  - b) specific
  - c) both a and b
  - d) none of these
- 6) A herbarium is a collection of \_\_\_\_\_ plant specimens mounted on sheets.
  - a) pressed
  - b) dried
  - c) both a and b
  - d) none of these
- 7) Sir J. C. Bose Botanical Garden in \_\_\_\_\_ is one of the largest government botany gardens in India.
  - a) Mumbai
  - b) Calcutta
  - c) Lucknow
  - d) Chennai
- 8) *Casia auriculata* is the scientific name of family \_\_\_\_\_.
  - a) Nyctaginaceae
  - b) Solanaceae
  - c) Liliaceae
  - d) Caesalpinaceae

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

**08**

- a) Define taxonomy.
- b) Give the long form of ICBN.
- c) What is Binomial Nomenclature?
- d) Define herbarium.
- e) Write two names of botanical garden of India.
- f) What is systematic?

- Q.3 Write short notes on any Two of the following. 08**
- a) Economic importance of family Liliaceae
  - b) Importance of Botanical Garden
  - c) Aims of Taxonomy
- Q.4 Answer the any two of the following. 08**
- a) Explain the Artificial Classification studied by you.
  - b) Describe the Nomenclature.
  - c) Write on Mounting and Labelling of herbarium preparation.
- Q.5 Answer any one of the following. 08**
- a) Describe the vegetative and reproductive character of family Solanaceae.
  - b) Describe the significance of herbarium.





- Q.3 Write short notes on any two of the following. 08**
- a) construction of UJT.
  - b) Working of Photo diode.
  - c) Intrinsic semiconductor.
- Q.4 Answer any Two of the following. 08**
- a) Explain IV characteristics of SCR.
  - b) Explain construction of MOSFET.
  - c) Explain graphical representation of H parameters of BJT in C.E. configuration.
- Q.5 Answer any one of the following. 08**
- a) Explain I-V characteristics BJT in Common Base configuration with neat circuit diagram of.
  - b) Explain construction and working of P-N junction diode.



- Q.3 Write short notes on any two of the following. 08**
- a) Physical characteristics of eskimo.
  - b) State the types of economic activities.
  - c) Scientific nature of human geography.
- Q.4 Answer any Two of the following. 08**
- a) State the importance of human geography.
  - b) State the characteristics of Hinduism.
  - c) State the nagas.
- Q.5 Answer any one of the following. 08**
- a) Describe the scope of human geography.
  - b) Explain the various language families in the world.

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Paper – III)**  
**Crystallography (19201214)**

Day & Date: Saturday, 15-07-2023  
 Time: 12:00 PM To 02:00 PM

Max. Marks: 40

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

**Q.1 Multiple choice questions:**

**08**

- 1) In \_\_\_\_\_ System, three equal and interchangeable axes present.
 

a) Cubic	b) Hexagonal
c) Orthorhombic	d) Monoclinic
- 2) Which of the following form belongs to Triclinic system?
 

a) Cube	b) Trapezohedron
c) Quarter Pyramid	d) Octahedron
- 3) In Hexagonal system, \_\_\_\_\_ planes of symmetry present.
 

a) 7	b) 5
c) 1	d) 3
- 4) The general formula of Pyramid is \_\_\_\_\_.
 

a) (100)	b) (001)
c) (110)	d) (111)
- 5) Type mineral of Monoclinic system is \_\_\_\_\_.
 

a) Gypsum	b) Barite
c) Beryl	d) Galena
- 6) Which of the following form cuts all three axes?
 

a) Octahedron	b) Prism
c) Dodecahedron	d) Basal Pinacoid
- 7) Intersection of adjacent faces of crystal forms \_\_\_\_\_.
 

a) edge	b) solid angle
c) fossil	d) interfacial angle
- 8) Di-hexagonal prism has \_\_\_\_\_ faces.
 

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

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

**08**

- 1) Define Crystal.
- 2) Describe Planes and Axes of Symmetry of Triclinic System.
- 3) Draw labeled diagram of crystallographic axes of Orthorhombic system.
- 4) Define Crystallography.
- 5) What is Form?
- 6) Define Dome.

- Q.3 Write short notes on any two of the following.** **08**
- 1) Crystallographic axes of Monoclinic and Triclinic system.
  - 2) Contact Goniometer
  - 3) Orthorhombic Pinacoid and their types
- Q.4 Answer any two of the following.** **08**
- 1) Describe Faces, Solid angle and interfacial angle of crystal with labeled diagram.
  - 2) What is Plane and Axes of Symmetry?
  - 3) Draw and Describe Pyramid crystal.
- Q.5 Answer any one of the following** **08**
- 1) Define crystal. Describe Crystallographic axes, Elements of Symmetry and any two forms of Cubic System.
  - 2) Define crystal. Describe Crystallographic axes, Elements of Symmetry and any two forms of Tetragonal System.

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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**ELECTRONICS (Paper - IV)**  
**Digital Electronics (19201227)**

Day & Date: Sunday, 16-07-2023  
 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 wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

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

**08**

- 1) TTL has \_\_\_\_\_ input transistor.
 

a) Normal	b) Multi collector
c) Multi base	d) Multi emitter
- 2) IC 7447 is \_\_\_\_\_.
 

a) Encoder	b) Decoder
c) Multiplexor	d) Counter
- 3) \_\_\_\_\_ number of AND gates used in demultiplexer 4:1.
 

a) Four	b) Three
c) Two	d) One
- 4) RS flipflop is set when \_\_\_\_\_.
 

a) R = S = 0	b) R = S = 1
c) R = 0, S = 1	d) R = 1, S = 0
- 5) Mod 5 counter requires minimum \_\_\_\_\_ flipflops.
 

a) Five	b) Three
c) Two	d) One
- 6) In case of shift register SIPO is \_\_\_\_\_.
 

a) Serial input parallel output	b) Standard input present output
c) Serial input present output	d) Standard input parallel output
- 7) \_\_\_\_\_ number of control lines required in 8 : 1 multiplexer.
 

a) Four	b) Three
c) Two	d) One
- 8) \_\_\_\_\_ IC is universal 4 bit shift register.
 

a) 7400	b) 7447
c) 7490	d) 7495

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

**08**

- a) What is meant by propagation delay in TTL?
- b) What is Decoder?
- c) Draw 4 bit PIPO shift register diagram.
- d) What is Counter?
- e) Draw truth table of JK flipflop.
- f) What is current sourcing?

- Q.3 Write a Short notes on any two of the following** **08**
- a) Write a note on Priority encoder IC 74147.
  - b) Write a note on D flip flop.
  - c) Write a note on IC 74153.
- Q.4 Answers any two of the following.** **08**
- a) Explain 4 bit synchronous counter.
  - b) Explain 8 to 1 multiplexer and write truth table.
  - c) Explain Right Shift Register & draw timing diagram.
- Q.5 Answer any one of the following.** **08**
- a) Draw diagram and explain TTL NAND gate.
  - b) Explain IC 7490 as a divided by 2, 5 & 10 counter & draw timing diagram.



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**B.Sc. (Semester - II) (Old) (CBCS) Examination: March/April-2023**  
**PHYSICAL GEOGRAPHY (Paper – IV)**  
**Human Geography - II (19201236)**

Day & Date: Sunday, 16-07-2023  
 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 wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

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

- 1) According to Malthus the growth of population as per \_\_\_\_\_ progression.
  - a) Geometric
  - b) Statistics
  - c) Arithmetic
  - d) None of these
- 2) The \_\_\_\_\_ theory was put forward by Notestein.
  - a) Industrial location
  - b) demographic transition
  - c) Continental Drift
  - d) None of these
- 3) Slums and pollution are \_\_\_\_\_ problem.
  - a) Rural-Urban Fringe
  - b) Rural
  - c) Urban
  - d) None of these
- 4) The \_\_\_\_\_ is Low populated continent in the world.
  - a) Asia
  - b) Africa
  - c) Europe
  - d) Australia
- 5) Oxford is the \_\_\_\_\_ city.
  - a) Education
  - b) Mining
  - c) Fishing
  - d) Industrial
- 6) Mining is the function of \_\_\_\_\_ settlement.
  - a) Urban
  - b) Rural
  - c) Urban-Rural fringe
  - d) Suburban
- 7) Terrestrial agriculture is found in \_\_\_\_\_ area.
  - a) Plateau
  - b) Plain
  - c) Mountain
  - d) Wet land
- 8) \_\_\_\_\_ is known as father of green revolution in India.
  - a) Sing
  - b) Deshpande
  - c) Symons
  - d) Swaminathan

**Q.2 Answers any four of the following question.****08**

- a) State any two factors affecting on the Mortality.
- b) What is an Optimum population?
- c) What is Urbanization?
- d) State any two functions of Rural Settlement.
- e) State any two types of Agriculture.
- f) Define Urban Settlement.

- Q.3 Write a Short notes on any two of the following question. 08**
- a) Age and Sex Composition
  - b) World Urbanization
  - c) Trends and Patterns of World Population
- Q.4 Answers any two of the following question. 08**
- a) Explain the factors affecting on the Agriculture.
  - b) Discuss the Demographic Transition Theory.
  - c) Explain the Problems of urban settlement.
- Q.5 Answers any one of the following questions. 08**
- a) Describe the Urban Settlements classification.
  - b) Explain the origin and history of Agriculture.



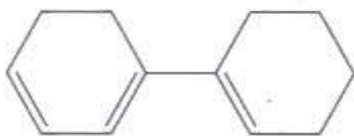
- Q.3 Write short notes on any two of the following.** **08**
- 1) Lower assembly of Polarized microscope.
  - 2) Twinning and their types
  - 3) Hardness of Mineral and Scale
- Q.4 Answer any two of the following.** **08**
- 1) Describe Isotropism with example.
  - 2) Describe Calcite Mineral.
  - 3) Explain any two types of Lusters in Minerals with example.
- Q.5 Answer any one of the following** **08**
- 1) Define Mineral. Describe Physical properties, chemical composition, Optical properties of Muscovite and Biotite.
  - 2) Define Mineral. Describe Physical properties, chemical composition, Optical properties of Orthoclase and Microcline.



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

08

- 1) Calculate the  $\lambda_{\max}$  for following compound.



- 2) What are geometrical isomers? Explain geometrical isomerism in benzaldoxime.  
3) Why formaldehyde gives Cannizzaro's reaction whereas acetaldehyde does not?  
4) Draw the structure of 18 crown -6 ether.  
5) Write action of following on phthallic acid.  
a) Soda lime  
b) Ammonia  
6) Write the synthesis of phenyl hydrazine from benzene diazonium chloride.

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

08

- 1) Reimer -Tiemann reaction with mechanism  
2) Perkin reaction with mechanism  
3) Acid and base catalyzed ring opening reaction of ethylene oxide

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

08

- 1) Write two methods of formation of ethylene glycol with reaction.  
2) What is the action of acetic anhydride and hydroiodic acid on citric acid & write uses of citric acid  
3) What is mean by diazotization reaction? Write synthesis of Congo Red.

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

08

- 1) Write various types of electronic transitions with example.  
2) Describe conformational analysis of n-butane with the help of energy profile diagram.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper-V)**  
**Data Structure (19201307)**

Day & Date: Tuesday, 11-07-2023  
 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 must be drawn wherever necessary.  
 4) Use of log table and calculator is allowed.

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

**08**

- 1) Linked List's Node must store \_\_\_\_\_.  
 a) The address of the next node if it exists  
 b) The value of the current node  
 c) Both a and b  
 d) None of the above
- 2) Which of the following algorithms are used to find the shortest path from a source node to all other nodes in a weighted graph?  
 a) BFS  
 b) Dijkstra's Algorithm  
 c) Prim's Algorithm  
 d) Kruskal's Algorithm
- 3) The recursive algorithm is implemented by using following data structure.  
 a) Queue  
 b) Array  
 c) List  
 d) Stack
- 4) \_\_\_\_\_ is very useful in situation when data have to stored and then retrieved in reverse.  
 a) Stack  
 b) List  
 c) Queue  
 d) Linked list
- 5) Linked list is considered as an example of \_\_\_\_\_ type of memory allocation.  
 a) Dynamic  
 b) Static  
 c) Compile time  
 d) Heap
- 6) Which of the following is not an application of binary search?  
 a) To find the lower/upper bound in an ordered sequence  
 b) Union of intervals  
 c) Debugging  
 d) To search in unordered list
- 7) Which of the following data structure can't store the non-homogeneous data elements?  
 a) Arrays  
 b) Records  
 c) Pointers  
 d) None
- 8) The complexity of merge sort algorithm is \_\_\_\_\_.  
 a)  $O(n)$   
 b)  $O(\log n)$   
 c)  $O(n^2)$   
 d)  $O(n \log n)$

- Q.2 Answer any four of the following.** **08**
- a) List out the advantages of using linked list.
  - b) Define abstract data type.
  - c) State the difference between stack and queue.
  - d) Define priority queue.
  - e) Define complete binary tree.
  - f) What do you mean by breadth first search?
- Q.3 Write short notes on any two of the following.**
- a) Explain adjacency matrix with example.
  - b) Explain Dequeue in detail.
  - c) Explain singly linked list with create operation.
- Q.4 Answer any Two of the following.** **08**
- a) Write an algorithm to evaluate postfix expression with example.
  - b) Write a program to implement bubble sort.
  - c) Write a program to create binary search tree.
- Q.5 Answer any one of the following.** **08**
- a) Write a program to implement sequential search.
  - b) Convert the following Infix Expression to Postfix by using an algorithm.  
 $A + B * (C - D) + E / F - G$





- Q.2 Answers any four of the following.** **08**
- a) State the Pearson rule.
  - b) Why transition elements can form colour?
  - c) Define the term ligands with suitable example.
  - d) Show the cis-trans isomerism in:
    - i)  $[\text{PtCl}_2(\text{NH}_3)_2(\text{Py})_2]$
    - ii)  $[\text{Co}(\text{NH}_3)_4\text{Cl}_2]$
  - e) Why d-block elements are called transition elements?
  - f) Draw the structure of  $[\text{Ni}(\text{DMG})_2]$  metal chelate.
- Q.3 Write short notes on any two of the following.** **08**
- a) EDTA as chelating agent.
  - b) EAN with suitable examples.
  - c) Magnetic behavior of transition element (spin only formula).
- Q.4 Answers any two of the following.** **08**
- a) How acids & bases can be defined on the basis of Lewis concept? with suitable examples.
  - b) Give the electronic configuration of 4d transition elements.
  - c) Distinguish between metal chelate and metal complex.
- Q.5 Answers any one of the following.** **08**
- a) Define isomerism. Discuss optical and geometrical isomerism in coordination compounds with CN=6.
  - b) Give the name, atomic symbol and electronic configuration of 3d & 5d transition elements.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper-VI)**  
**Design Analysis and Algorithm (19201308)**

Day & Date: Thursday, 13-07-2023  
 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 Multiple choice questions.**

**08**

- 1) Which of the following is not a Greedy algorithm?
  - a) Kruskal's algorithm
  - b) Bellman ford algorithm
  - c) Prim's algorithm
  - d) Dijkstra's algorithm
- 2) Let in a file the frequency of letters i,n,d,e,x are 16,7,17,25,20 respectively. Which of the following is the Huffman code of the letter d?
  - a) 01
  - b) 101
  - c) 00
  - d) 11
- 3) The average case complexity of Insertion Sort is \_\_\_\_\_.
  - a)  $O(2n)$
  - b)  $O(n^2)$
  - c)  $O(n^3)$
  - d)  $O(2n)$
- 4) Which of the following algorithm design technique is used in the quick sort algorithm?
  - a) Dynamic programming
  - b) Backtracking
  - c) Divide and conquer
  - d) Greedy method
- 5) The approach used by linear search is \_\_\_\_\_.
  - a) Greedy
  - b) Divide & Conquer
  - c) Probabilistic
  - d) Brute-Force
- 6) Breadth First Traversal (BFS) is a method to traverse \_\_\_\_\_.
  - a) Graph using shortest path
  - b) All successors of a visited node before any successors of any of those successors
  - c) A single path of the graph as far as it can go
  - d) None of these
- 7) Dynamic Programming Method is not suitable to solve \_\_\_\_\_.
  - a) 0/1 Knapsack Problem
  - b) Making Change Problem
  - c) Binomial Co-efficient
  - d) Fractional Knapsack Problem
- 8) Binary Search method uses as input \_\_\_\_\_.
  - a) Unsorted Array
  - b) Linear Linked List
  - c) Sorted Array
  - d) Hash Table

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

**08**

- a) What is algorithm?
- b) What is Hashing?
- c) What are the algorithm Design Techniques?
- d) What is Graph?
- e) What are the advantages of an algorithm?
- f) What is Time Complexity and space complexity?

- Q.3 Write short notes on any Two of the following. 08**
- a) Asymptotic notation
  - b) Rabin-Karp algorithm
  - c) Prim's Algorithm
- Q.4 Answer the any two of the following. 08**
- a) Explain Divide and conquer algorithm with its different Approaches.
  - b) Explain Brute force approach.
  - c) Explain merge sort with suitable example.
- Q.5 Answer any one of the following. 08**
- a) What is Backtracking? Explain N-Queens Problem with suitable example.
  - b) Consider the problem having weights and profits are:  
Weights: {3, 4, 6, 5}  
Profits: {2, 3, 1, 4}  
The weight of the knapsack is 8 kg  
The number of items is 4  
The above problem can be solved by using the 0/1 knapsack problem method.



- Q.3 Write short notes on any TWO of the following. 08**
- a) Carbon microphone
  - b) Ostwald's viscometer.
  - c) Gyroscope.
- Q.4 Answer any TWO of the following. 08**
- a) Calculate the critical velocity of a rolling disc of radius 30 cm. rolling over a horizontal surface.
  - b) Obtain an expression for depression produced at the end of a bar forming a cantilever.
  - c) Define scalar triple product and obtain its value in determinant form.
- Q.5 Answer any ONE of the following. 08**
- a) Define gyrostatic pendulum. Obtain an expression for its period.
  - b) What is acoustics of buildings? Explain various factors affecting the acoustics of buildings.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**BIO-CHEMISTRY (Paper – I)**  
**Biomolecules (19201303)**

Day & Date: Saturday, 15-07-2023  
 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 Multiple choice questions:**

**08**

- 1) Which of the following disease is caused by deficiency of niacin?
  - a) Scurvy
  - b) Rickets
  - c) Pellagra
  - d) Pernicious anemia
- 2) \_\_\_\_\_ is not a factor responsible for the denaturation of proteins.
  - a) pH change
  - b) Organic change
  - c) Heat
  - d) Charge
- 3) \_\_\_\_\_ is the purine base of nucleic acid.
  - a) Cytosine
  - b) Thymine
  - c) Uracil
  - d) Adenine
- 4) Building blocks of nucleic acids are \_\_\_\_\_.
  - a) amino acids
  - b) nucleosides
  - c) nucleotides
  - d) histones
- 5) Which of the following is a fat soluble vitamin?
  - a) Vitamin B
  - b) Vitamin C
  - c) Vitamin B12
  - d) Vitamin K
- 6) Which is simplest amino acid?
  - a) Glycine
  - b) Alanine
  - c) Asparagine
  - d) Tyrosine
- 7) Terpenes are lipids derived from \_\_\_\_\_.
  - a) isoprene
  - b) phospholipids
  - c) waxes
  - d) sterols
- 8) Disaccharide sucrose structure is composed by \_\_\_\_\_ two monosaccharide units.
  - a) lactose and glucose
  - b) galactose and glucose
  - c) fructose and glucose
  - d) mannose and glucose

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

**08**

- 1) What is the function of cholesterol?
- 2) Write the structure of ribose and fructose.
- 3) Define simple lipids with one example.
- 4) Write the properties of amino acids.
- 5) What is phosphodiester linkage?
- 6) Write the sources of thiamine and niacin?

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

**08**

- 1) Write note on phospholipid and spingolipid.
- 2) Write the structure and role of cellulose.
- 3) Explain Watson Crick model of DNA.

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

**08**

- 1) Write note on coenzyme and holoenzyme.
- 2) Write the structure and functions of mRNA.
- 3) Write the biochemical role and deficiency disorders of retinol.

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

**08**

- 1) Write the classification of carbohydrates. Write structure and role of erythrose and erythrulose.
- 2) Write the structures of primary and secondary proteins. What are forces involved in stabilising native structure of protein.



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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023  
PLANT PROTECTION (Paper – I)**

**Major crops and methods of integrated plant protection (19201325)**

Day & Date: Saturday, 15-07-2023  
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 a logarithmic table and calculator is allowed.

**Q.1 Multiple choice questions:**

**08**

- 1) Coffee rust came to India from \_\_\_\_\_ along with coffee powder.
  - a) Shrilanka
  - b) Cuba
  - c) Brazil
  - d) Peru
- 2) \_\_\_\_\_ of potato came to India from Ireland.
  - a) Late blight
  - b) Early blight
  - c) both a and b
  - d) None of these
- 3) Powdery mildew of \_\_\_\_\_ came to India along with stem cuttings.
  - a) tomato
  - b) grapes
  - c) bean
  - d) mango
- 4) Activity of pathogen is reduced through the agency of any other living organism except \_\_\_\_\_.
  - a) animal
  - b) man
  - c) plant
  - d) none of these
- 5) \_\_\_\_\_ control of insect pest is based on the exploitation of mutual antagonism.
  - a) Biological
  - b) Chemical
  - c) Physical
  - d) Mechanical
- 6) The use of pesticides caused many losses to \_\_\_\_\_.
  - a) agroecosystem
  - b) air pollution
  - c) water pollution
  - d) all of these
- 7) \_\_\_\_\_ control has given scientific base since 16 to 19 centuries.
  - a) Chemical
  - b) Mechanical
  - c) Biological
  - d) all of these
- 8) \_\_\_\_\_ eats cottony cushion scale of citrus and destroy them.
  - a) Vedalia beetle
  - b) Medalia beetle
  - c) Sedalia beetle
  - d) Kedalia beetle

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

**08**

- 1) Define plant protection.
- 2) Write two uses of Jowar.
- 3) What is mean by agriculture?
- 4) Define biofertilizers.
- 5) Give the definition of fungicides.
- 6) Define the quarantine.

- Q.3 Write short notes on any two of the following. 08**
- 1) Netting
  - 2) Bactericides
  - 3) Tillage
- Q.4 Answer any two of the following. 08**
- 1) Explain the types biofertilizers studied by you.
  - 2) Describe the domestic quarantine.
  - 3) Give the general account of use of resistant varieties.
- Q.5 Answer any one of the following 08**
- 1) Explain the cultural practice of brinjal with respect to morphology, soil types, fertilizers and irrigation.
  - 2) Describe the cultural practice of sugarcane with respect to morphology, irrigation, yield and economic importance.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**PHYSICS (Paper-VI)**  
**Electronics (19201324)**

Day & Date: Sunday, 16-07-2023  
 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 and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

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

**08**

- 1) The disadvantage of voltage divider bias is that it has \_\_\_\_\_.  
 a) high stability factor                      b) low base current  
 c) many resistors                              d) many inductors
- 2) A feedback circuit usually employs \_\_\_\_\_ feedback.  
 a) resistive                                      b) capacitive  
 c) inductive                                      d) diode
- 3) Which oscillator is characterized by a split capacitor in its tank circuit?  
 a) Phase shift                                  b) Colpitts  
 c) Wein bridge                                  d) Hartley
- 4) \_\_\_\_\_ oscillator is fixed frequency oscillator.  
 a) Phase shift                                  b) Colpitts  
 c) Crystal                                         d) Hartley
- 5) FET has high input impedance because \_\_\_\_\_.  
 a) it is made by semiconductor material  
 b) input is reverse biased  
 c) of impurity atom  
 d) input is forward biased
- 6) UJT may be better used as \_\_\_\_\_.  
 a) Amplifier                                      b) Clamper  
 c) Rectifier                                        d) saw tooth wave generator
- 7) If a voltage regulator experience 8 mV change in its output when its input changes by 1 V. The line regulation is \_\_\_\_\_ mV/V.  
 a) 5    b) 6  
 c) 4    d) 8
- 8) Lissajous pattern obtained on a CRO screen is a circle, frequency of two signals are \_\_\_\_\_.  
 a) equal    b) unequal  
 c) zero    d) infinity

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

**08**

- a) Draw the symbols of n channel and p channel FET.
- b) What is differential amplifier? Write the modes of operations.
- c) Compare amplifier with oscillator.

- d) Derive relation among FET parameters.
- e) When CRO is used to determine unknown frequency, the steady wave pattern on 1  $\mu$ s knob gives 8 divisions on the horizontal scale as wavelength. What is the unknown frequency?
- f) Define the term Line and load regulation.

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

- a) Digital Multi Meter
- b) Dual power supply using 3 pin IC
- c) Hartley oscillator

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

- a) A transistor phase shift oscillator uses three identical sections in the feedback network, the values of components are  $R = 10\text{ k}\Omega$  and  $C = 470\text{ pF}$ . Calculate the frequency of oscillations.
- b) Explain the characteristics of UJT.
- c) Draw and explain Zener voltage regulator.

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

- a) What is biasing? What are types of biasing? Explain voltage divider bias.
- b) Explain principle, construction and working of CRO.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**BIO CHEMISTRY (Paper – II)**  
**Biochemical Techniques (19201304)**

Day & Date: Monday, 17-07-2023  
 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 Multiple choice questions:**

**08**

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

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

**08**

- 1) What is immunodiffusion?
- 2) What is the meaning of transmittance and specific absorbance?
- 3) Write the advantages of Gel permeation chromatography.
- 4) What is Lawry's assay?
- 5) Write the two advantages of colorimeter.
- 6) Write the difference between acid value and saponification value.

- Q.3 Write short notes on any two of the following.** **08**
- 1) Explain the Beer-Lamberts law.
  - 2) How chromatoplate is prepared in TLC? Explain sample application process in TLC.
  - 3) Write principle and technique of agarose gel electrophoresis.
- Q.4 Answer any two of the following.** **08**
- 1) Write the technique of ELISA.
  - 2) Explain phenol-H<sub>2</sub>SO<sub>4</sub> method for carbohydrates.
  - 3) Write note on western blotting technique.
- Q.5 Answer any one of the following** **08**
- 1) Write the principle, technique and applications of HPLC.
  - 2) Write principle, technique and applications of polyacrylamide gel electrophoresis



- d) Write the symptoms of Downy mildew of Grapes
- e) Name any two fungal disease.
- f) What is resistance?

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

- a) Factors affecting infection.
- b) Koch's postulates.
- c) Symptoms and control measures of Rust of soybean.

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

- a) Write the classification of diseases based on pathogens.
- b) Explain the methods of inoculation.
- c) Write causal organism and symptoms of *citrus* canker.

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

- a) Write the classification of diseases based on necrotic symptoms.
- b) Explain the assessment of diseases in crop plants.



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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**STATISTICS (Paper-V)**  
**Probability Distributions – I (19201329)**

Day & Date: Tuesday, 18-07-2023  
 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) Use of Calculator is allowed.

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

- 1) If  $X \sim P(\lambda)$  and second raw moment about origin ( $\mu_2$ ) is 12, then the mean of the Poisson variate is
  - a) 43
  - b) 12
  - c) 3
  - d) -4
- 2) If  $X \sim Geo(p)$  then  $P[X \geq 2] = \underline{\hspace{2cm}}$ .
  - a)  $q^2$
  - b)  $p^2$
  - c)  $pq^2$
  - d)  $p^2q$
- 3) If  $X \sim NB(k, p)$  such that  $E(X) = 15$  and  $V(X) = 60$ , then
  - a)  $k = 5, p = \frac{3}{4}$
  - b)  $k = 5, p = \frac{1}{4}$
  - c)  $k = 15, p = \frac{1}{2}$
  - d)  $k = 3, p = \frac{1}{5}$
- 4) Let  $(X_1, X_2, X_3, X_4)$  be a random vector follows multinomial distribution with usual notations, then  $E(X_3)$  is
  - a)  $4P_3$
  - b)  $4P_3(1 - P_3)$
  - c)  $P_1P_3$
  - d)  $nP_3$
- 5) A continuous random variable X with p.d.f.  $f(x)$  given by
 
$$f(x) = kx; 0 < x < 1$$

$$= 0; \text{otherwise}$$
 Then k must be \_\_\_\_\_.
  - a) 1
  - b) 2
  - c) 0
  - d) None of these
- 6) If  $M_X(t)$  is mgf of a continuous r.v. X, then  $M_X(0) =$ 
  - a) 1
  - b) 0
  - c) T
  - d) None of these
- 7) Which of the following relations is true, if X and Y are independent random variables?
  - a)  $E(XY) = E(X)E(Y)$
  - b)  $f(x, y) = f(x)f(y)$  for all  $x, y \in R$
  - c)  $F(x, y) = F(x)F(y)$  for all  $x, y \in R$
  - d) All of these
- 8) If  $(X, Y)$  is a bivariate random variable with joint p. d. f.  $f(x, y) = 4xy; 0 < x, y < 1$  then conditional p. d. f. of Y given  $X=x$  is
  - a)  $3y$
  - b)  $2y$
  - c)  $(3/2)y$
  - d) None of the above

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

- Define Poisson distribution.
- Define Geometric distribution.
- Define Negative Binomial distribution.
- Define Multinomial distribution.
- Define probability density function.
- Define covariance

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

- If  $X \sim P(\lambda)$  such that  $P(X = 0) = \frac{1}{2}$  find  $E(X)$  and  $V(X)$
- Find the recurrence relation for probability of negative binomial distribution.
- The density function of X is
 
$$f(x) = \begin{cases} a + bx^2 & ; 0 \leq x \leq 1 \\ 0 & ; \text{otherwise} \end{cases}$$
 If  $E(X) = \frac{1}{5}$ , find a and b

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

- State and prove lack of memory property of geometric distribution.
- The random variable X has probability density function defined by

$$f(x) = \begin{cases} \frac{1}{2} & ; 0 \leq x \leq 1 \\ \frac{1}{18} (x - 4)^2 & ; 1 \leq x \leq 4 \\ 0 & ; \text{otherwise} \end{cases}$$

Find the distribution function of x hence find the value of median.

- The joint probability density function is given by

$$f(x, y) = \begin{cases} 10xy^2 & ; 0 < x < y < 1 \\ 0 & ; \text{otherwise} \end{cases}$$

Find the marginal probability density function of X and Y

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

- Show that Poisson distribution as a limiting case of binomial distribution.
- If X and Y have joint probability density function

$$f(x, y) = \begin{cases} \frac{3}{4} + xy & ; 0 < x < 1, 0 < y < 1 \\ 0 & ; \text{otherwise} \end{cases}$$

Find

- Marginal density function of X.
- Marginal density function of Y.
- Conditional density function of X given  $Y = y$ .
- Conditional expectation X given  $Y = y$ .

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**METEOROLOGY (Paper – I)**  
**Climatology (19201321)**

Day & Date: Wednesday, 19-07-2023  
 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 table and calculator is allowed.

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

**08**

- 1) Climatology is compounded by \_\_\_\_\_ word.
  - a) Arab
  - b) Greek
  - c) Roman
  - d) French
- 2) An \_\_\_\_\_ is an immense body of air.
  - a) Front
  - b) air mass
  - c) Frontolysis
  - d) Humidity
- 3) \_\_\_\_\_ is the science which studies the atmosphere.
  - a) Hydrology
  - b) Climatology
  - c) Pedology
  - d) Phytology
- 4) There are \_\_\_\_\_ major source region of air masses.
  - a) 6
  - b) 4
  - c) 10
  - d) 8
- 5) Carbon dioxide occupies \_\_\_\_\_% gaseous in the atmosphere.
  - a) 0.09
  - b) 0.004
  - c) 21
  - d) 0.03
- 6) Monsoon is the wind system of the \_\_\_\_\_ region.
  - a) Tropical
  - b) Polar
  - c) sub-polar
  - d) sub-tropical
- 7) Normal lapse rate in the atmosphere is \_\_\_\_\_<sup>0</sup> C per 1000 m.
  - a) 5.6
  - b) 7.5
  - c) 6.5
  - d) 4.6
- 8) Isotherm are the lines joining places of equal \_\_\_\_\_.
  - a) Salinity
  - b) Pressure
  - c) Rainfall
  - d) Temperature

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

**08**

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

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



- Q.3 Write short notes on any two of the following. 08**
- a) Write the classification of organic compounds.
  - b) Explain Gibbs phase rule.
  - c) Write note on lattice energy of crystals.
- Q.4 Answer any Two of the following. 08**
- a) Explain crystal structure of zinc sulphide.
  - b) Explain origin of charge in colloids.
  - c) Explain silica as chemical sediment.
- Q.5 Answer any one of the following. 08**
- a) Explain lattice energy of crystals, radius ratio and structure of Cesium Chloride.
  - b) Explain general characteristics and classification of organic compounds.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Paper-V)**  
**Cell Biology (19201331)**

Day &amp; Date: Wednesday, 19-07-2023

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 correct alternatives****08**

- 1) Single celled organisms called \_\_\_\_\_.  
 a) Prokaryotic cell                      b) Eukaryotic cell  
 c) Haploid cell                            d) None of these
- 2) Nuclear membrane is present in \_\_\_\_\_.  
 a) Eukaryotic cell                        b) Prokaryotic cell  
 c) Mitochondria                            d) None of these
- 3) The infection macroscopic agent that replicates in living cell called \_\_\_\_\_.  
 a) Virus                                        b) Bacteria  
 c) Fungus                                      d) None of these
- 4) The circular RNA that infectious pathogens are \_\_\_\_\_.  
 a) Viroid                                        b) Virus  
 c) Bacteria                                      d) None of these
- 5) Plasma membrane also called \_\_\_\_\_.  
 a) Cell membrane                        b) Cell wall  
 c) Inner membrane                        d) None of these
- 6) The plasma membrane provide \_\_\_\_\_.  
 a) Protection                                b) Circulation  
 c) Secretion                                    d) None of these
- 7) Singer and Nicolson model is called \_\_\_\_\_.  
 a) Fluid mosaic mode  
 b) Davison & Danielle mode  
 c) Coaster & Grendel Model  
 d) None of these
- 8) The Endoplasmic Reticulum (ER) is continuous membrane in \_\_\_\_\_.  
 a) Eukaryotic cell                        b) Cell wall  
 c) Plant cell                                    d) None of these

**Q.2 Solve any four of the following:****08**

- a) Describe structure a function of Golgi Apparatus.
- b) Write on structure of mitochondria.
- c) Describe Endosymbiotic hypothesis of mitochondria.
- d) What is cytoskeleton?
- e) Describe on active and passive Transport plasma membrane.

- Q.3 Write short note** **08**
- 1) Cell cycle
  - 2) Mitosis
  - 3) Cell signaling
- Q.4 Answer any two of the following.** **08**
- 1) Structure and function of Nucleus
  - 2) Types of cell signaling
  - 3) Role of secondary messengers (cAMP)
- Q.5 Answer any one of the following.** **08**
- 1) Nuclear pore complex
  - 2) Structure and functions of lysosomes





- Q.2 Answer any four of the following:** **08**
- a) State the relation of  $r_{13.2}$  with  $b_{13.2}$  and  $b_{31.2}$
  - b) Define multiple correlation coefficients.
  - c) Define partial correlation coefficient.
  - d) Define defect and defectives.
  - e) Give the  $3\sigma$  control limits for R-chart when standards are not given.
  - f) Show that Probability that a specified unit is included in the sample is  $\frac{n}{N}$
- Q.3 Write short note on any two the following:** **08**
- a) State any two properties of residual and prove any one.
  - b) Discuss advantages of sampling method over census method.
  - c) Distinguish between process control and product control.
- Q.4 Answer any Two of the following:** **08**
- a) Explain the construction of  $\bar{X}$  chart when standards are given.
  - b) Explain SRSWR and SRSWOR
  - c) Find variance of residual  $X_{1.23}$ ,
- Q.5 Answer any one of the following** **08**
- a) Derive the equation of plane of regression of  $X_1$  on  $X_2$  and  $X_3$  by least square method.
  - b) Show that sample mean square is unbiased estimator of population mean square.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**METEOROLOGY (Paper-II)**  
**General Meteorology (19201322)**

Day & Date: Friday, 21-07-2023  
 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 table and calculator is allowed.

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

**08**

- 1) Which of the following relation hold good for wavelength of violet, yellow and red colours in case of the sunlight?
  - a)  $\lambda_y > \lambda_v > \lambda_r$
  - b)  $\lambda_v > \lambda_y > \lambda_r$
  - c)  $\lambda_r > \lambda_y > \lambda_v$
  - d)  $\lambda_v > \lambda_r > \lambda_y$
- 2) By Rayleigh's law of scattering \_\_\_\_\_
  - a)  $I \propto \frac{1}{\lambda^5}$
  - b)  $I \propto \frac{1}{\lambda^4}$
  - c)  $I \propto \frac{1}{\lambda}$
  - d)  $I \propto \frac{1}{\lambda^2}$
- 3) Which of the following has the highest entropy?
  - a) Air
  - b) Diamond
  - c) Liquid nitrogen
  - d) Mercury
- 4) Which of the following is a motivating force to bring air mass in motion?
  - a) pseudo force
  - b) Pressure gradient force
  - c) velocity gradient
  - d) Coriolis force
- 5) Which of the following relation is incorrect?
  - a) velocity gradient =  $\frac{dv}{dr}$
  - b) density gradient =  $\frac{d\rho}{dz}$
  - c) centrifugal force =  $mv$
  - d) Coriolis force =  $-2m(\vec{\omega} \times \vec{V})$
- 6) A typical output of a solar cell is V = 0.45 volts and I = 15 mA. Its output power is \_\_\_\_\_ mW.
  - a) 0.03
  - b) 14.55
  - c) 33.33
  - d) 6.75
- 7) During launching of a satellite, the rocket must overcome \_\_\_\_\_
  - a) gravitational force to go up in addition to the atmospheric drag
  - b) electrostatic force
  - c) electromagnetic force
  - d) magnetic force
- 8) Which of the following statement is incorrect?
  - a) useful energy is called exergy
  - b) worthless energy is called anergy
  - c) coal is conventional resource
  - d) petroleum oil is nonconventional resource

- Q.2 Answer any four of the following.** **08**
- 1) What is coherent scattering?
  - 2) How is SMOG formed?
  - 3) Mention different layers of the Earth's atmosphere.
  - 4) State Buys-Ballots law.
  - 5) How chain and modules are formed using solar cells?
  - 6) Write down energy chain for coal fired power plant.
- Q.3 Write short notes on any two of the following.** **08**
- a) Explain greenhouse effect.
  - b) Discuss non-inertial frame of reference and pseudo forces.
  - c) Discuss interrelation between energy, man, and environment.
- Q.4 Answer any Two of the following.** **08**
- a) Explain the radiation budget of earth and its atmosphere in relation with scattering, reflection, and absorption.
  - b) Explain Geo-strophic wind.
  - c) Discuss energy demand.
- Q.5 Answer any one of the following.** **08**
- a) Explain the formation of ozone in the stratosphere.
  - b) Discuss launching of an artificial satellite. What is a geo-synchronous satellite?

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**GEO-CHEMISTRY Paper-II**  
**Introduction to Solar System and Geo-Sphers (19201314)**

Day & Date: Friday, 21-07-2023  
 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 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) What is the average percentage of SiO<sub>2</sub> in the igneous rocks:
 

a) 59.14%	b) 55.50 %
c) 79.15%	d) 80.00%
- 2) The hydrosphere is the:
 

a) Continuous shell of water	b) Discontinuous shell of water
c) Uniform shell of water	d) None of these.
- 3) Siderites consist essentially of a.
 

a) Nickle - iron alloy	b) Nickel-iron alloy and silicates
c) Silicates only	d) Silicates and graphite's
- 4) The Sun's major constituents are \_\_\_\_\_
 

a) H & He,	b) O <sub>2</sub> and N <sub>2</sub> ,
c) NH <sub>3</sub> and CO <sub>2</sub> ,	d) None of these
- 5) Elements which readily-form ions with an outermost 8-electron shell are:
 

a) Siderophile	b) Chalcophile
c) Lithophile	d) Atmosphere
- 6) In the primeval atmosphere, at the first stage of its evolution \_\_\_\_\_ was major constituent.
 

a) CH <sub>4</sub>	b) N <sub>2</sub>
c) O <sub>2</sub>	d) None of the these
- 7) The average composition of terrestrial water is \_\_\_\_\_.
 

a) Ca > Na > Mg	b) Na > Ca > Mg
c) Mg > Na > Ca	d) Ca > Mg > Na
- 8) The S wave shadow zone is caused by the \_\_\_\_\_.
 

a) The crust and mantle boundary
b) The outer core
c) the lower mantle
d) the inner core

- Q.2 Answer any four of the following:** **08**
- a) What are the compositions of Sial and Sima?
  - b) Name the two types of Aerolites.
  - c) What is pyrolite?
  - d) Names of variable constituents of the atmosphere.
  - e) What is the thickness of transition zone present in the upper mantle?
  - f) Which element has affinity towards metallic iron?
- Q.3 Write short notes on any two of the following:** **08**
- a) Structure of atmosphere.
  - b) Gains and losses of elements in the oceanic water
  - c) Structure and composition of lower mantle?
- Q.4 Answer any Two of the following:** **08**
- a) Describe atmospheric additions and losses during geologic time.
  - b) Explain in brief the cosmic abundance of elements.
  - c) Discuss the siderolite
- Q.5 Answer any one of the following:** **08**
- a) Describe in brief zonal structure of the earth.
  - b) Explain the primary differentiation of elements.



- Q.2 Answer any four of the following. 08**
- a) Write a note on Mortality.
  - b) Write a note on Primary consumers with example.
  - c) Write a note on energy flow in ecosystem.
  - d) Give an account on diversity indices.
  - e) Write a note on water hardness.
  - f) Give an account on History of ecology.
- Q.3 Write short notes on any two of the following. 08**
- a) Describe the effect of Temperature and light on animals.
  - b) Write a note on Species richness.
  - c) Give an account on commensalism and mutualism.
- Q.4 Answer any Two of the following. 08**
- a) Give an account on freshwater ecosystem of both lotic and lentic.
  - b) Give an account on Biodiversity hot-spots and sacred groves in India with examples.
  - c) What are abiotic factors.
- Q.5 Answer any one of the following. 08**
- a) Give an account on Pond ecosystem: with reference to food chain.
  - b) Give an account on general characteristics & faunal adaptations of terrestrial ecosystem.





- Q.2 Answer any FOUR of the following.** **08**
- Give the equation of tangent and normal in Cartesian form.
  - Give the formula for length tangent and normal at any point to the curve.
  - Prove that  $f(c)$  is the maximum value of the function of  $f'(c) = 0$  and  $f''(c) > 0$
  - Explain stationary and extreme point.
  - If  $x = r \cos \theta, y = r \sin \theta$  then prove that  $\frac{\partial(e,\theta)}{\partial(x,y)} = 1/r$
  - Find the formula for radius of curvature in parametric equation.
- Q.3 Answer any two of the following.** **08**
- Find the Radius of Curvature in pedal equation with figure.
  - Find the maximum and minimum value of the function.  
 $f(x) = 8x^5 - 15x^4 + 10x^2$
  - Find the length of perpendicular from pole to the tangent.
- Q.4 Answer any two of the following.** **08**
- Find the length of polar sub-tangent and polar sub-normal.
  - Find the necessary condition for extreme value.
  - Prove that  $\frac{\partial(u,v,w)}{\partial(x,y,z)} \cdot \frac{\partial(x,y,z)}{\partial(u,v,w)} = 1$
- Q.5 Answer any one of the following.** **08**
- Define radius of curvature and prove that  $\frac{ds}{dx} = \sqrt{1 + \left(\frac{dy}{dx}\right)^2}$   
(length of arc as a function)
  - Determine the pedal equation of a curve where Cartesian an equation is given.  
Also find the pedal equation of the parabola,  
 $y^2 = 4a(x + a)$

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**B.Sc. (Semester – III) (CBCS) Examination: March/April-2023**  
**BOTANY (Paper - V)**  
**Plant Anatomy (19201301)**

Day & Date: Sunday, 23-07-2023  
 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.

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

- 1) \_\_\_\_\_ among the following cells have the ability of continuous cell division.
 

a) Epidermis	b) Idioblast
c) Meristem	d) Cutical
- 2) Cambium occurs in \_\_\_\_\_ forms.
 

a) Fusiform	b) Ray initials
c) Both a & b	d) Cortical cells
- 3) Companion cells are along with \_\_\_\_\_.
 

a) Trachids	b) Vessels
c) Fibers	d) Sieve tube
- 4) \_\_\_\_\_ function of Apical Meristem.
 

a) Increase in length	b) Increase in girth
c) Increase in flowering	d) None
- 5) \_\_\_\_\_ among the following is complex tissue.
 

a) Collenchyma	b) Parenchyma
c) Xylem	d) Sclerenchyma
- 6) Vessels are only present in \_\_\_\_\_.
 

a) Gymnosperm	b) Angiosperm
c) Pteridophyte	d) Bryophyte
- 7) The outer most layer of stele in dicot stem is \_\_\_\_\_.
 

a) Pericycle	b) Endodermis
c) Epidermis	d) None
- 8) The underground part of plant body is called \_\_\_\_\_.
 

a) Shoot system	b) Root system
c) Leaf system	d) Embryonic cell system

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

- a) Define Meristem.
- b) Enlist the types of simple tissue
- c) Give the functions of xylem.
- d) What is conjugative tissue?
- e) What is epidermis? Give function of epidermis
- f) Describe structure of dicot stomata.

- Q.3 Write short notes on any two of the following** **08**
- a) Give the significance of excretory tissue system.
  - b) Give basic structure of wood & its types.
  - c) Give the classification of Meristematic cells.
- Q.4 Answer any Two of the following.** **08**
- a) Vascular bundles of dicot stem & root.
  - b) Describe components of cambium with diagram & add a note on its function.
  - c) Describe tunica corpus theory.
- Q.5 Answer any one of the following** **08**
- a) Describe in brief epidermal tissue system.
  - b) Describe in detail primary structure of dicot stem with suitable diagram.



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

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

08

- a) Find  $L = \{\sin t \cos t\}$   
 b) State the second shifting theorem for Laplace transforms.  
 c) Find:  $L^{-1}\left\{\frac{P}{p^2+2} + \frac{6p}{p^2-16}\right\}$   
 d) State linearity property of Laplace inverse.  
 e) Solve  $\frac{d^2y}{dt^2} + y = 0$  under the condition that  $y = 1, \frac{dy}{dt} = 0$  when  $t = 0$   
 f) If  $y(x, t)$  is a function of  $x$  and  $t$ , then prove that:  

$$L\left\{\frac{dy}{dx}\right\} = \frac{d\bar{y}}{dx}$$

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

08

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

$$\int_0^\infty \frac{e^{-at} - e^{-bt}}{t} dt$$

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

08

- a) Let  $F(t)$  be a periodic function with period  $T > 0$ , that is  
 $F(u + T) = F(u), F(u + 2T) = 4$  etc., then  
 show the  $L\{F(t)\} = \frac{\int_0^T e^{-pt}F(t)dt}{1-e^{-PT}}$   
 b) Find  $L^{-1}\left\{\log \frac{p+3}{p+2}\right\}$   
 c) Solve  $ty'' + y' + 4ty = 0, y(0) = 3, y'(0) = 0$

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

08

- a) State and prove Convolution theorem.  
 b) i) If  $F(t)$  is a function of class  $A$  and  $L\{F(t)\} = f(p)$ , then prove that  
 $L\{tF(t)\} = -f^1(p)$   
 ii) Find  $L\{(t + 2)^2 e^t\}$

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**BOTANY (Paper – VI)**  
**Plant Metabolism (19201302)**

Day & Date: Tuesday, 25-07-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

**Q.1 Multiple choice questions.**

**08**

- 1) Holoenzyme is made up of \_\_\_\_\_.  
 a) apoenzyme and zymogen                      b) Apoenzyme and co-enzyme  
 c) Co-enzyme and prosthetic                  d) Prosthetic group and co factor
- 2) All enzymes are \_\_\_\_\_ in nature.  
 a) Carbohydrate                                      b) Vitamin  
 c) Protein    d) Fat
- 3) Conversion of ammonia to nitrite and then nitrate is called \_\_\_\_\_.  
 a) Ammonification                                  b) Denitrification  
 c) assimilation                                        d) Nitrification
- 4) The hormone auxin is isolated by \_\_\_\_\_.  
 a) Went    b) Skoog  
 c) Darwin    d) Miller
- 5) The hormone responsible for apical dominance \_\_\_\_\_.  
 a) ABA    b) GA  
 c) IAA     d) Kinetin
- 6) Out of following \_\_\_\_\_ Macro nutrient.  
 a) Nitrogen    b) Hydrogen  
 c) Oxygen    d) Carbon
- 7) Sucrose is made up of from two molecules of monosaccharide those are \_\_\_\_\_.  
 a) Glucose and Glucose                          b) Glucose and Ribose  
 c) Glucose and Fructose                        d) None of these
- 8) Interveinal chlorosis in young leaves due to deficiency of \_\_\_\_\_.  
 a) Potassium    b) Phosphorus  
 c) Sodium    d) Iron

- Q.2 Answer any four the following.** **08**
- a) What is oligosaccharide?
  - b) Define Enzyme.
  - c) Enlist growth inhibitors studied by you.
  - d) Write the significance of Nitrogen fixation.
  - e) Give any two examples of polysaccharide.
  - f) Write the role of Manganese.
- Q.3 Write short note on any two of the following.** **08**
- a) Mechanism of enzyme action.
  - b) Abscisic acid.
  - c) Deficiency symptoms of potassium in plants.
- Q.4 Attempt any two of the following.** **08**
- a) Write the physical role of auxin.
  - b) Explain the properties of enzyme.
  - c) Write the role of Nitrogen in plant health.
- Q.5 Attempt any one of the following.** **08**
- a) What is monosaccharide? Give the properties of monosaccharide.
  - b) Explain in brief mechanism of Nitrogen fixation.





- Q.3 Write short note on any two of the following.** **08**
- a) Capacitor filter
  - b) Working of LC tank circuit
  - c) DC load line
- Q.4 Answer any Two of the following.** **08**
- a) Explain current series negative feedback amplifier?
  - b) Explain RC coupled amplifier.
  - c) Explain construction and working of half wave rectifier.
- Q.5 Answer any one of the following** **08**
- a) Explain construction and working of Wien bridge oscillator and give the formulae of its frequency.
  - b) Explain how stability of BJT increases in negative feedback amplifier.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper – V)**  
**Climatology (19201311)**

Day & Date: Wednesday, 26-07-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

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

**08**

- 1) Precipitation has been derived from \_\_\_\_\_ word.
  - a) Roman
  - b) Latin
  - c) Greek
  - d) Indian
- 2) About 97% of the air is concentrated in the lower \_\_\_\_\_ KM.
  - a) 9
  - b) 29
  - c) 19
  - d) 39
- 3) CO<sub>2</sub> constituents \_\_\_\_\_ % of the total composition of the atmosphere.
  - a) 0.03
  - b) 3.03
  - c) 30.03
  - d) 303.03
- 4) \_\_\_\_\_ is the first / lowest layer of the atmosphere.
  - a) Stratosphere
  - b) Troposphere
  - c) Exosphere
  - d) Mesosphere
- 5) About \_\_\_\_\_ calories heat is received per sq.km per minute at the out limit of the atmosphere.
  - a) 1.94
  - b) 2.94
  - c) 3.94
  - d) 4.94
- 6) The lines drawn on maps joining the places of equal temp, are called \_\_\_\_\_.
  - a) Isotherms
  - b) Isohyets
  - c) Mesolines
  - d) None of these
- 7) Koppen published his first scheme of world climate in \_\_\_\_\_.
  - a) 1980
  - b) 1900
  - c) 1950
  - d) 1910
- 8) Climatology is compounded of two \_\_\_\_\_ words, Klima + Logos.
  - a) Greek
  - b) Roman
  - c) Indian
  - d) American

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

**08**

- a) Jet Stream
- b) Troposphere
- c) Sunspots
- d) Types of rainfall
- e) Definition of water vapour
- f) Evaporation

- Q.3 Write short notes of any two.** **08**
- a) Tropical cyclone
  - b) Monsoon
  - c) Meaning and definition of Climatology
- Q.4 Answer any two of the following.** **08**
- a) What is mean by Insolation & Explain the factors affecting the distribution of Insolation.
  - b) Explain the structure of the atmosphere.
  - c) Define the heat budget & explain it with suitable diagram.
- Q.5 Answer any one of the following.** **08**
- a) Explain Koppen's classification of the world climate.
  - b) Explain the composition of the Atmosphere.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Paper - V)**  
**Igneous Petrology (19201315)**

Day & Date: Thursday, 27-07-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

**Q.1 Multiple choice questions.**

**08**

- 1) Gabbro is \_\_\_\_\_ Igneous rock.
  - a) Intrusive
  - b) Volcanic
  - c) Extrusive
  - d) none of these
- 2) \_\_\_\_\_ is coarse grained igneous rock.
  - a) Basalt
  - b) Trachyte
  - c) Rhyolite
  - d) Rhyolite
- 3) The essential mineral in Basalt rock are \_\_\_\_\_.
  - a) Quartz, feldspar
  - b) Quartz, Augite
  - c) Quartz, olivine
  - d) olivine, Augite
- 4) Uni component rocks are extremely \_\_\_\_\_.
  - a) Abundant
  - b) Moderate
  - c) Rare
  - d) None of these
- 5) Quartz is absent \_\_\_\_\_ rock.
  - a) Acidic
  - b) Ultrabasic
  - c) Basic
  - d) None of these
- 6) The acid magma rich in \_\_\_\_\_.
  - a) Si, Na and K
  - b) Ca, Mg and Fe
  - c) K, Mg and Al
  - d) Fe and Mg
- 7) The well-developed crystal faces in Igneous rock are called \_\_\_\_\_.
  - a) Euhedral
  - b) Anhedral
  - c) Subhedral
  - d) None of these
- 8) The end product of reaction relation in magma is \_\_\_\_\_.
  - a) Olivine
  - b) Pyroxene
  - c) Amphibole
  - d) quartz

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

**08**

- a) Define concordant forms?
- b) What is magma and lava?
- c) What is eutectic point?
- d) What is isotherm?
- e) Define holocrystalline texture.
- f) Minerals in Granite.

- Q.3 Write short notes on any two of the following. 08**
- a) Describe the batholith.
  - b) Describe Volcanic igneous rock.
  - c) Describe the glass and crystals.
- Q.4 Answer any two of the following. 08**
- a) Describe the plutonic igneous rock.
  - b) Describe any two discordant forms of igneous rock.
  - c) Describe the crystallization of Uni component magma.
- Q.5 Answer any one of the following 08**
- a) Describe structures of igneous rock.
  - b) Describe the differentiation process.



- Q.2 Answer any four of the following. 08**
- a) Define mesophiles.
  - b) Define plasmolysis.
  - c) Define synchronous growth.
  - d) State the function of cell membrane.
  - e) Define endospore.
  - f) Define active transport.
- Q.3 Write short notes on any two of the following. 08**
- a) Describe in detail cell wall of gram-positive bacteria.
  - b) Write a note on fates of pyruvate.
  - c) Discuss in short effect of pH on growth of microorganism?
- Q.4 Answer any two of the following. 08**
- a) Define photophosphorylation. Discuss in detail non-cyclic photophosphorylation.
  - b) Describe in detail TCA cycle.
  - c) Describe in detail ultra-structure of flagella.
- Q.5 Answer any one of the following 08**
- a) Define growth. Discuss in detail bacterial growth phases.
  - b) What is oxidative phosphorylation? Describe in detail electron transport chain of prokaryotes.



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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**ELECTRONICS (Paper – VI)**  
**Pulse & Switching Circuits (19201310)**

Day & Date: Friday, 28-07-2023  
 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 and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

**Q.1 Multiple choice questions**

**08**

- 1) The multivibrator that do not require external trigger for its operations is \_\_\_\_\_.  
 a) astable multivibrator                      b) monostable multivibrator  
 c) bistable multivibrator                      d) both b) and c)
- 2) The circuit that introduces a de level into an ac input signal is called \_\_\_\_\_.  
 a) Integrator                                      b) Differentiator  
 c) Clipper    d) Clamper
- 3) To use transistor as a switch, the transistor must be operated in \_\_\_\_\_.  
 a) Saturated region                              b) Cut-off region  
 c) Active region                                  d) Both a and b
- 4) In \_\_\_\_\_, the three resistors of five kilo ohms are connected in series.  
 a) IC 74121    b) IC 7400  
 c) IC 555    d) IC 810
- 5) The differentiator circuit converts sine wave into \_\_\_\_\_.  
 a) Spikes    b) Cosine wave  
 c) Triangular wave                                d) Square wave
- 6) Application of IC 555 are \_\_\_\_\_.  
 a) Astable multivibrator.                      b) Bistable multivibrator  
 c) Battery charger                                d) All of the above
- 7) \_\_\_\_\_ IC is single shot multivibrator.  
 a) 74131    b) 74121  
 c) 555    d) 7400
- 8) If UJT oscillator circuit is provided by constant source then \_\_\_\_\_ type of waveforms are generated.  
 a) Triangular                                      b) Square  
 c) Positive ramp                                  d) Saw tooth

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

**08**

- a) Draw the diagram and waveforms of negative clipper circuit.
- b) Calculate pulse width of monostable multivibrator using BJT, when  $R = 10\text{ K}\Omega$  and  $C = 100\ \mu\text{f}$  are connected.
- c) Give the features of using timer IC 555
- d) Define the term sweep speed error and transmission error of time base circuit.
- e) What is multivibrator? What are its types?
- f) What is need of time base circuit?

- Q.3 Write short notes on any two of the following: 08**
- a) Action of transistor as a switch.
  - b) IC 555 as a Voltage controlled oscillator.
  - c) Miller integrator.
- Q.4 Answer any Two of the following: 08**
- a) Explain A stable multivibrator by using gate.
  - b) Draw diagram and Explain response of RC differentiator with square wave input.
  - c) Explain construction and working of Schmitt's trigger circuit.
- Q.5 Answer any one of the following: 08**
- a) Explain operation, waveforms and derivation of gate width of Monostable Multivibrator using IC 555.
  - b) Explain operation, waveforms of a stable multivibrator by using BJT. Derive formulae for its output frequency.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper – VI)**  
**Geography of India (19201312)**

Day & Date: Friday, 28-07-2023  
 Time: 03:00 PM To 05:00 PM

Max. Marks: 40

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

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ is passed through the center of India.
  - a) Capricorn
  - b) Tropic of Cancer
  - c) Equator
  - d) None of above
- 2) Regur soil is the most important for \_\_\_\_\_ cultivation.
  - a) Cotton
  - b) Coffee
  - c) Fruits
  - d) Sugarcane
- 3) Lowest Scheduled tribes population is found in \_\_\_\_\_.
  - a) Mizoram
  - b) Nagaland
  - c) Goa
  - d) Karnataka
- 4) In \_\_\_\_\_ state Konkani language is spoken.
  - a) Rajasthan
  - b) Tamilnadu
  - c) Kerala
  - d) Maharashtra
- 5) Sex ratio in India defined as the number of females per \_\_\_\_\_ of males.
  - a) 100
  - b) 1000
  - c) 10000
  - d) None of above
- 6) The kharif season beings \_\_\_\_\_.
  - a) In December
  - b) With the onset of south western monsoon
  - c) At the end of the south western monsoon
  - d) In March
- 7) Bombay high is famous for \_\_\_\_\_.
  - a) Petroleum
  - b) Gold
  - c) Coal
  - d) None of above
- 8) \_\_\_\_\_ has the highest sex ratio in India.
  - a) Kerala
  - b) Karnataka
  - c) Mizoram
  - d) Tamilnadu

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

**08**

- a) What is tribe?
- b) What is climate?
- c) What is a power resource?
- d) What is information technology?
- e) What is population density?
- f) What is geographical extent of India?

- Q.3 Write a Short notes on any two of the following. 08**
- a) Growth of Indian population.
  - b) Automobile Industry in India.
  - c) Importance of forest.
- Q.4 Answer any two of the following. 08**
- a) What is a mineral resource? Explain the distribution of Iron ore in India?
  - b) Explain the distribution of population on the basis of Religion?
  - c) Explain the Climatic regions of India?
- Q.5 Answer any one of the following. 08**
- a) What is Regionalization? Explain the economic regionalization of India?
  - b) What is Population? Explain the distribution of Population in India?



- Q.3 Write short notes on any two of the following. 08**
- a) Stratification structure
  - b) Greenschist Facies
  - c) Marble
- Q.4 Answer any Two of the following. 08**
- a) Describe Slaty structure.
  - b) Explain Residual deposits with examples.
  - c) Size of sediments
- Q.5 Answer any one of the following questions. 08**
- a) Define Sedimentary rocks. Describe Conglomerate and Breccia.
  - b) Define Metamorphic rocks. Describe Agents of Metamorphism.

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**B.Sc. (Semester - III) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Paper-VI)**  
**Bacterial Genetics (19201318)**

Day & Date: Sunday, 30-07-2023  
 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 and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.  
 (At. Wts.: H=1, C=12, O=16, N=14, Na=23, Cl=35.5)

**Q.1 Multiple Choice Questions.**

**08**

- 1) What is the composition of a nucleotide?
  - a) a sugar + a phosphate
  - b) a base + a sugar
  - c) a base + a phosphate
  - d) a base + a sugar + phosphate
- 2) The sugar in RNA is \_\_\_\_\_, the sugar in DNA is \_\_\_\_\_.
  - a) deoxyribose, ribose
  - b) ribose, deoxyribose
  - c) ribose, phosphate
  - d) ribose, uracil
- 3) Which of the following enzymes separates the two strands of DNA during replication?
  - a) Gyrase
  - b) Topoisomerase
  - c) Helicase
  - d) DNA polymerase
- 4) Which one of the following nucleotide bases is not found in RNA?
  - a) Adenine
  - b) Thymine
  - c) Guanine
  - d) Cytosine
- 5) The codon is a \_\_\_\_\_.
  - a) Singlet
  - b) Duplet
  - c) Triplet
  - d) Quadruplet
- 6) Name the type of mutation in which the cause of the mutation is not known?
  - a) Spontaneous mutation
  - b) Suppressor mutation
  - c) Nonsense mutation
  - d) Mis-sense mutation
- 7) In Griffith's experiment which of the following things was identified as the transforming principle?
  - a) DNA
  - b) RNA
  - c) Proteins
  - d) Carbohydrates
- 8) Transfer of genetic material from the donor to recipient bacterium through cell contact is termed as \_\_\_\_\_.
  - a) Transduction
  - b) Recombination
  - c) Conjugation
  - d) Transformation

- Q.2 Answer any four of the following. 08**
- a) Enlist all enzymes involved in replication.
  - b) Define Mutation.
  - c) What is spontaneous Mutation?
  - d) What is Cistron?
  - e) Enlist all chemical mutagens.
  - f) Define plasmid.
- Q.3 Write short notes on any two of the following. 08**
- a) Genotype and Phenotype
  - b) DNA repair mechanism by Photoreactivation
  - c) Griffith Experiment
- Q.4 Answer any Two of the following. 08**
- a) Define Genetic code and explain various properties of the genetic code.
  - b) Describe various properties of Plasmid.
  - c) Discuss the mechanism of conjugation.
- Q.5 Answer any one of the following. 08**
- a) Explain in detail the mechanism of DNA replication.
  - b) Enlist all types of mutations and describe in detail the Nonsense and Missense mutations.





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

- a) Explain Miller indices.
- b) What is the principle used in moving boundary method?
- c) Entropy of liquid is higher than that of solid, why?
- d) Define standard entropy.
- e) Define the terms:
  - a) Specific conductance
  - b) Equivalent conductance
- f) Draw diagrams showing (100), (110), and (111) planes in simple cubic lattice.

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

- a) Describe the entropy change for physical transformations.
- b) State the Nernst distribution law. What are its limitations?
- c) Discuss the various factors that influence the transport number.

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

- a) Explain the application of distribution law for the determination of molecular weight of solute in different solvents. Succinic acid has normal molecular state in water and ether. When varying amounts of acid were shaken with ether-water mixture. The following results were obtained.

$C_{\text{water}}$	25.4	33.3	43.1
$C_{\text{ether}}$	4.2	5.5	7.1

Calculate the partition coefficient and show that these figures illustrate the distribution law.

- b) Show that for thermodynamically reversible process, the entropy change is always zero at constant temperature.
- c) Define sparingly soluble salt. For saturated solution of AgCl the specific conductance was found to be  $2.7 \times 10^{-6}$  mhos/cm and that of water was  $1.1 \times 10^{-6}$  mhos/cm. The ionic conductance at infinite dilution of  $\text{Ag}^+$  and  $\text{Cl}^-$  ions are 61.9 and 76.3 mhos/cm respectively. Calculate the solubility of AgCl in g/lit. (At. Wt: Ag = 108, Cl = 35.5)

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

- a) What is Bragg's equation? Give a full account of the crystal structure of NaCl.
- b) Discuss in detail Hittorf's rule for the migration of ions during electrolysis with the schematic diagram.

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Set P

**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper – VII)**  
**Software Engineering (19201410)**

Day & Date: Tuesday, 20-06-2023  
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

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

- 1) \_\_\_\_\_ is a software development life cycle model that is chosen if the development team has less experience on similar projects.
  - a) Iterative Enhancement Model
  - b) RAD
  - c) Spiral
  - d) Waterfall
- 2) Which of the following is the Characteristics of good software?
  - a) Transitional
  - b) Operational
  - c) Maintenance
  - d) All of the above
- 3) Which of the following word correctly summarized the importance of software design?
  - a) Quality
  - b) Complexity
  - c) Efficiency
  - d) Accuracy
- 4) The context diagram is also known as \_\_\_\_\_.
  - a) Level-0 DFD
  - b) Level-1 DFD
  - c) Level-2 DFD
  - d) All of the above
- 5) A \_\_\_\_\_ is represented graphically by an arrow into or out of a process.
  - a) Process
  - b) Entity
  - c) Level
  - d) Flow
- 6) White Box techniques are also classified as \_\_\_\_\_.
  - a) Design based testing
  - b) Structural testing
  - c) Error guessing technique
  - d) None of the mentioned
- 7) In software maintenance removing errors spotted by users is known as \_\_\_\_\_.
  - a) Adaptive
  - b) Corrective
  - c) Perfective
  - d) Preventive
- 8) Functional testing is a \_\_\_\_\_.
  - a) Test design technique
  - b) Test level
  - c) SDLC Model
  - d) Test type

- Q.2 Answer any four of the following.** **08**
- 1) What is economic feasibility?
  - 2) What are the drawbacks of the spiral model?
  - 3) What is ERD?
  - 4) What is HIPO?
  - 5) Which are the various problems in SDLC?
  - 6) What is functional dependency?
- Q.3 Write short notes on any two of the following.** **08**
- 1) Waterfall Model
  - 2) Operational Feasibility
  - 3) White box testing
- Q.4 Answer any two of the following.** **08**
- 1) Explain qualities of software in detail.
  - 2) Explain advantages and disadvantages of Decision Tables.
  - 3) Explain Interview technique in detail.
- Q.5 Answer any one of the following** **08**
- 1) Explain Prototyping in detail.
  - 2) Draw an ER and DFD diagram for college admission system.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Paper - VIII)**  
**Analytical & Industrial Inorganic Chemistry (19201408)**

Day & Date: Wednesday, 21-06-2023  
 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 labelled diagram and give equations wherever necessary.

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

**08**

- 1) \_\_\_\_\_ is essential for EDTA titration.
  - a) Acid
  - b) Neutralization
  - c) Unbuffering
  - d) Buffering
- 2) In Haber's process forward reaction is favoured by \_\_\_\_\_ in temperature.
  - a) increase
  - b) decrease
  - c) moderate
  - d) None of these
- 3) In Bessemer process, the hot blast of air is passed from \_\_\_\_\_ of Bessemer converter.
  - a) top
  - b) bottom
  - c) left side
  - d) right side
- 4)  $\text{Al}(\text{OH})_3$  is mostly \_\_\_\_\_ precipitate.
  - a) gelatinous
  - b) crystalline
  - c) amorphous
  - d) curdy
- 5) For phenolphthalein indicator when  $[\text{HIn}] = [\text{In}]$ , colour of the indicator will be \_\_\_\_\_.
  - a) colourless
  - b) pink
  - c) intermediate
  - d) either colourless or pink
- 6) Haematite is \_\_\_\_\_.
  - a) a gangue
  - b) a flux
  - c) a mineral
  - d) an ore
- 7) The oxine is a \_\_\_\_\_ chelating agent.
  - a) unidentate
  - b) bidentate
  - c) tridentate
  - d) quadridentate
- 8) The chief product of blast furnace is \_\_\_\_\_.
  - a) slag
  - b) cementite
  - c) pig iron
  - d) furnace gases

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

**08**

- a) Give the structural of Eriochrome Black T.
- b) What is steel? Give its composition.
- c) Give pH of phenolphthalein and methyl red indicator.
- d) Define the terms metallurgy and slag.
- e) What are industrial heavy chemicals?

- Q.3 Write short notes on any two of the following. 08**
- a) Nucleation
  - b) Froth floatation process
  - c) Ostwald's quinoid theory
- Q.4 Answers any two of the following. 08**
- a) Draw a neat labelled diagram for manufacture of ammonia by Haber's process. Give effect of pressure and temperature on the yield of ammonia.
  - b) Distinguish between co precipitation and post precipitation.
  - c) Explain electrolytic reduction of copper.
- Q.5 Answers any one of the following. 08**
- a) Discuss the conversion of cast iron into steel by L. D. process. Discuss advantages of L.D. process.
  - b) Define neutralization curve. Explain choice of indicator for strong acid and strong base titration with the help of neutralization curve.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper– VIII)**  
**Database Management System (19201411)**

Day & Date: Thursday, 22-06-2023  
 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 labelled diagrams must be drawn wherever necessary.  
 4) Use of log table and calculator is allowed.

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

- 1) The term \_\_\_\_\_ is used refer to a row.
 

a) Attribute	b) Tuple
c) Field	d) Instance
- 2) Which of the following cannot be used to modify the data in a database?
 

a) delete	b) update
c) drop	d) insert
- 3) Which one of the following sorts rows in SQL?
 

a) SORT BY	b) ALIGN BY
c) GROUP BY	d) ORDER BY
- 4) Which SQL function is used to find the average value of any column?
 

a) Mean()	b) Avg()
c) Average()	d) Sum()
- 5) In MySQL, which command is used to modify the table values.
 

a) Select	b) Update
c) Modify	d) Alter
- 6) CROSS JOIN and JOIN are similar to \_\_\_\_\_.
 

a) INNER JOIN	b) NATURAL JOIN
c) OUTER JOIN	d) CARTESIAN JOIN
- 7) PL/SQL Variable needs to be declared in the \_\_\_\_\_.
 

a) Variable Section	b) Declaration Section
c) Initialization Section	d) None of the above
- 8) Database locking concept is used to solve the problem of \_\_\_\_\_.
 

a) Lost Update	b) Uncommitted Dependency
c) Inconsistent Data	d) All of the above

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

- a) What is Database?
- b) What is Normalization?
- c) Explain 3 tier architecture.
- d) Define concurrency control.
- e) Explain key Constraints.
- f) What is Generalization?

- Q.3 Write short notes on any two of the following. 08**
- a) Components of DBMS
  - b) E-R model
  - c) Relational Algebra operations
- Q.4 Answer any Two of the following. 08**
- a) What are the advantages of DBMS?
  - b) Explain the Database Architecture.
  - c) What is Data model? Explain types of Data models.
- Q.5 Answer any one of the following. 08**
- a) What is transaction? Explain properties and states of transaction.
  - b) What is join? Explain types of join.



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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**PHYSICS (Paper - VII)**  
**Optics (19201434)**

Day & Date: Friday, 23-06-2023  
 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 Select the correct alternative.**

**08**

- 1) The relation between longitudinal magnification  $m_x$  and lateral magnification  $m_y$  for an optical system is \_\_\_\_\_.
  - a)  $m_x = m_y^2$
  - b)  $m_x^2 = m_y$
  - c)  $m_x = m_y$
  - d)  $m_x^3 = m_y$
- 2) In Fabry-Perot interferometer, the resultant amplitude is obtained by using \_\_\_\_\_ of vector.
  - a) Polygon
  - b) triangle
  - c) Parallelogram
  - d) Conical
- 3) The two glass plates in Michelson's interferometer are inclined to the incident beam direction at \_\_\_\_\_.
  - a)  $45^\circ$
  - b)  $30^\circ$
  - c)  $60^\circ$
  - d)  $90^\circ$
- 4) By Rayleigh's criterion, the two spectral lines are said to be just resolved if the intensity at the dip is \_\_\_\_\_ times the intensity of either of the maxima.
  - a)  $\frac{8}{\pi^2}$
  - b)  $\frac{4}{\pi^2}$
  - c)  $\frac{\pi^2}{8}$
  - d)  $\frac{\pi^2}{4}$
- 5) For Negative crystal, except along the optic axis \_\_\_\_\_.
  - a)  $V_e < V_o$
  - b)  $V_e = V_o = 0$
  - c)  $V_e > V_o$
  - d)  $V_e = V_o = 1$
- 6) Those substances which rotate the plane of vibration of the polarized light towards the right side are known as \_\_\_\_\_.
  - a) laevorotatory
  - b) optically active
  - c) dextrorotatory
  - d) none of above
- 7) The basic principles of optical fibers is \_\_\_\_\_.
  - a) interference
  - b) total internal reflection
  - c) reflection
  - d) refraction
- 8) The refractive index of the core of graded index fiber varies about the axis in \_\_\_\_\_.
  - a) parabolic manner
  - b) spherical manner
  - c) linearly
  - d) cylindrical

- Q.2 Answer any four of the following. 08**
- 1) State Rayleigh's criterion for limit of resolution.
  - 2) What is a Quarter wave plate?
  - 3) Define 'numerical aperture'.
  - 4) State any four advantages of optical fiber.
  - 5) Calculate the thickness of half wave plate for sodium light of wavelength  $5890 \text{ \AA}$  and refractive index  $\mu_o = 1.54$ ,  $\mu_e = 1.55$
  - 6) How F.P. interferometer is superior over Michelson's interferometer?
- Q.3 Write short notes on any two of the following. 08**
- 1) Describe the construction and working of Nicol prism.
  - 2) Write note on step index fiber.
  - 3) Describe the construction and working of Michelson's interferometer.
- Q.4 Answer any Two of the following. 08**
- 1) Explain the rectilinear propagation of light on the basis of Fresnel's half period zone.
  - 2) Explain application of Fabry-Perot interferometer for measurement of difference in wavelength.
  - 3) Obtain Newton's formula for a lens system.
- Q.5 Answer any one of the following. 08**
- 1) Obtain an expression for equivalent focal length of two thin lenses separated by finite distance.
  - 2) How Zone plate is prepared? Explain how a zone plate acts like a lens having multiple foci. Derive an expression for its focal length.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**BIO-CHEMISTRY (Paper - III)**  
**Nutrition and Metabolism (19201404)**

Day & Date: Saturday, 01-07-2023  
 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 Multiple choice questions.**

**08**

- 1) During which condition, beta oxidation is stimulated?
  - a) Well fed condition
  - b) Starvation
  - c) Both
  - d) None of the above
- 2) Among blood buffers, the \_\_\_\_\_ system is most important in regulating blood pH.
  - a) bicarbonate
  - b) acetate
  - c) nitrate
  - d) phosphate
- 3) The electron transport chain and ATP synthesis system are situated on the \_\_\_\_\_.
  - a) nuclear envelope
  - b) chromosomes
  - c) inner mitochondrial membrane
  - d) lysosomes
- 4) Extra heat production over calculated calorific value, after metabolism of given food is the \_\_\_\_\_ action.
  - a) specific dynamic
  - b) energy assimilation
  - c) gastric reflux
  - d) hunger induced
- 5) The enzyme involved in renal regulation of pH is \_\_\_\_\_.
  - a) ammonium oxidase
  - b) nitrate reductase
  - c) carbonic anhydrase
  - d) amino transferase
- 6) The \_\_\_\_\_ acts as an inhibitor of oxidative phosphorylation.
  - a) oligomycin
  - b) rotenone
  - c) amytal
  - d) antimycin
- 7) BMR is elevated in \_\_\_\_\_.
  - a) under nutrition
  - b) Starvation
  - c) Hypothyroidism
  - d) Hyperthyroidism
- 8) What is the net gain through the beta oxidation of palmitic acid?
  - a) 131 ATP
  - b) 130 ATP
  - c) 129 ATP
  - d) 132 ATP

- Q.2 Answer any four of the following.** **08**
- 1) Write the meaning of respiratory chain.
  - 2) What are the functions of water?
  - 3) Write the meaning of lipid metabolism.
  - 4) What is pH regulation?
  - 5) Define transamination, and deamination.
  - 6) What are the sources of atoms in pyrimidine?
- Q.3 Write short notes on any two of the following.** **08**
- 1) Explain  $\beta$ -oxidation of palmitic acid.
  - 2) Write the general reactions of amino acid metabolism.
  - 3) Write note on production of acid and base by body.
- Q.4 Answer any Two of the following.** **08**
- 1) Explain components of respiratory chain.
  - 2) What are the nutritional aspects of carbohydrates?
  - 3) Write note on inhibitors of electron transport chain.
- Q.5 Answer any One of the following.** **08**
- 1) Write note on minerals in diet. Explain role of essential and non-essential fatty acids.
  - 2) What is decarboxylation? Explain in detail Urea cycle.



- Q.3 Write short notes on the following (Any Two)** **08**
- 1) Losses caused by rats in storage and field.
  - 2) Ploughing
  - 3) 2-4 D
- Q.4 Answer the following (Any Two)** **08**
- 1) Management of weed *Cynadon dactylon*.
  - 2) Explain the Parasitic weeds.
  - 3) Write on biological method of management by insect.
- Q.5 Answer the following (Any One)** **08**
- 1) Give morphology, reproduction, ecology, dispersal and management of *Parthenium hysteroporus* weed.
  - 2) Give morphology, reproduction, ecology, dispersal and management of *Euphorbia hirta*.



- Q.2 Answers any four of the following.** **08**
- a) State postulates of Eienstein's special theory of relativity.
  - b) State any two hypothesis of matter waves.
  - c) Write any one neutron induced reaction.
  - d) What is nuclear fission?
  - e) State Pouli's exclusion principle.
  - f) Define phase velocity and group velocity.
- Q.3 Write short notes on any two of the following.** **08**
- a) Write note on L-S and J-J coupling.
  - b) Obtain Einstein's mass energy relation.
  - c) Write note on quantum numbers associated with vector atom model.
- Q.4 Answers any two of the following.** **08**
- a) Explain in short nuclear reactor with labelled diagram.
  - b) Explain construction and working of Stern-Gerlach experiment.
  - c) A body of mass 200 gm is moving with velocity of 10 m/s. Find its De-Broglie wavelength. (Given  $h = 6.62 \times 10^{-34}$  JS)
- Q.5 Answers any one of the following.** **08**
- a) Explain Michelson-Morley experiment and obtain the equation for fringe width.
  - b) Obtain an expression for change in wavelength of scattered radiations.



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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**BIO-CHEMISTRY (Paper - IV)**  
**Molecular Biochemistry & Diseases (19201405)**

Day & Date: Monday, 03-07-2023  
 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 and give equations wherever necessary.

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

- 1) Glycoprotein \_\_\_\_\_ is used for detection of AIDS.
  - a) gp210
  - b) gp120
  - c) gp220
  - d) gp320
- 2) In genetic engineering experiment, restriction enzymes can be used for \_\_\_\_\_.
  - a) bacterial DNA only
  - b) viral DNA only
  - c) any DNA fragment
  - d) Eukaryotic DNA only
- 3) IgG molecule is formed from \_\_\_\_\_ polypeptide chains joined by disulphide bonds.
  - a) 2
  - b) 3
  - c) 4
  - d) 5
- 4) Aromatic hydrocarbon present in \_\_\_\_\_ cause lung cancer.
  - a) alcohol
  - b) cigarette
  - c) juice
  - d) milk
- 5) Building blocks of nucleic acids are \_\_\_\_\_.
  - a) Nucleotides
  - b) Nucleosides
  - c) Amino acids
  - d) Histones
- 6) Pancreas secret \_\_\_\_\_ hormone.
  - a) adrenaline
  - b) insulin
  - c) growth
  - d) thyroxine
- 7) \_\_\_\_\_ antibody has ability of placental transfer.
  - a) IgD
  - b) IgE
  - c) IgG
  - d) IgA
- 8) Insulin is made of \_\_\_\_\_ amino acids.
  - a) 30
  - b) 41
  - c) 51
  - d) 21

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

- 1) Write the factors stimulating insulin secretion.
- 2) Write 2-3 applications of bioinformatics.
- 3) Explain the active site of enzyme.
- 4) What are hypoglycemic drugs?
- 5) Write the characteristics of tumor cells.
- 6) What is Operon concept?

- Q.3 Write short notes on any Two of the following. 08**
- 1) Write the derivation of Michaelis-Menten equation for single substrate.
  - 2) Illustrate Gene cloning technique with insulin gene cloning.
  - 3) Explain tumor markers- $\alpha$ -fetoprotein (AFP) in cancer.
- Q.4 Answer any Two of the following. 08**
- 1) Write note on natural and acquired immunity.
  - 2) Explain immunological abnormalities in AIDS.
  - 3) What is retinopathy and cardiovascular disease.
- Q.5 Answer any One of the following. 08**
- 1) Explain Lock & key model and induced fit hypothesis.
  - 2) Explain replication of DNA. What is transcription in prokaryotes and translation in prokaryotes?



- Q.3 Write short note on any two of the following. 08**
- a) Effect of insecticides on respiratory and nervous system of insects.
  - b) Rice weevil
  - c) Losses caused by insect pests.
- Q.4 Answer any Two of the following. 08**
- a) Write an account of Jowar stem borer w.r.t scientific name, marks of identification and damage caused.
  - b) Describe the principles of pest control.
  - c) Describe the plant origin insecticides.
- Q.5 Answer any one of the following. 08**
- a) Write the general characters of typical insect with reference to mouth parts, types of legs and abdomen.
  - b) Write an account of wooly aphid w.r.t marks of identification, life cycle and damage caused.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**STATISTICS (Paper - VII)**  
**Probability Distributions - II (19201443)**

Day & Date: Tuesday, 04-07-2023  
 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 correct alternative from the option.**

**08**

- 1) Uniform distribution is \_\_\_\_\_.  
 a) Symmetric  
 b) Positively skewed  
 c) Negatively skewed  
 d) both b & c
- 2) Let the r. v.  $X$  have exponential distribution with parameter  $\theta$ , then mean of  $X$  is \_\_\_\_\_.  
 a)  $\theta^2$   
 b)  $\theta$   
 c)  $1/\theta$   
 d)  $1/\theta^2$
- 3) If  $X \sim N(\mu, \sigma^2)$ , then \_\_\_\_\_.  
 a) Mean = Median = Mode  
 b) Mean > Median > Mode  
 c) Mean < Median < Mode  
 d) None of these
- 4) If  $X \sim G(4, 3)$  then distribution of  $2X$  is \_\_\_\_\_.  
 a)  $G(2, 3)$   
 b)  $\exp(2)$   
 c)  $G(4, 3/2)$   
 d)  $G(4, 2)$
- 5) If  $X \sim N(0, 1)$  then distribution of  $X^2$  is \_\_\_\_\_.  
 a) Chi-square with 1 d. f.  
 b) Chi-square with  $n$  d. f.  
 c) Normal distribution  
 d) None of these
- 6) If  $X \sim \beta_I(m, n)$  distribution, then  $1 - X$  has \_\_\_\_\_ distribution.  
 a)  $\beta_{II}(m, n)$   
 b)  $\beta_I(n, m)$   
 c)  $\beta_{II}(n, m)$   
 d) None of these
- 7) Third order central moment of student's  $t$  - distribution.  
 a)  $n$   
 b)  $1$   
 c)  $0$   
 d) does not exists
- 8) If  $t \sim t_n$  then distribution of  $t^2$  is \_\_\_\_\_ distribution.  
 a)  $F_{1, n}$   
 b)  $F_{n1, n2}$   
 c)  $t_n$   
 d) None of these

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

**08**

- 1) To find mean of  $U[a, b]$  distribution.
- 2) State mean and variance  $N(\mu, \sigma^2)$  distribution.
- 3) State additive property of gamma distribution.
- 4) Write definition of Snedecor's  $F$ - distribution.
- 5) State m.g.f of  $N(\mu, \sigma^2)$  distribution.

- Q.3 Attempt any Two of the following questions. 08**
- 1) State and prove lack of memory property of exponential distribution.
  - 2) Find harmonic mean of beta distribution of first kind.
  - 3) Let  $X \sim N(\mu, \sigma^2)$  distribution, then find distribution of  $Y = aX + b$
- Q.4 Attempt any Two of the following questions. 08**
- 1) If  $X \sim \beta_{II}(m, n)$ , then find  $E(X)$ .
  - 2) Find mode of chi-square variate with  $n$  d.f.
  - 3) Find m.g.f. of  $U[a, b]$  distribution
- Q.5 Attempt any One of the following questions. 08**
- 1) If  $X \sim G(\alpha, \lambda_1)$  and  $Y \sim G(\alpha, \lambda_2)$  and  $X$  &  $Y$  are independent variates then find distribution of  $\frac{X}{X+Y}$
  - 2) Derive the pdf of chi-square variate with  $n$  d.f.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**METEOROLOGY (Paper – III)**  
**Applied Climatology (19201431)**

Day & Date: Wednesday, 05-07-2023  
 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 and give equations wherever necessary.  
 4) Use of logarithmic table and calculator is allowed.

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

**08**

- 1) Surface pressure varies routinely from about \_\_\_\_\_ mb to 1050 mb.
 

a) 950	b) 955
c) 960	d) 965
- 2) The last Tiros was launched in \_\_\_\_\_.
 

a) 1960	b) 1965
c) 1970	d) 1975
- 3) The term 'forecast' was first applied in meteorology by \_\_\_\_\_.
 

a) Miller	b) Fitzroy
c) Coriolis	d) Trewartha
- 4) Statistical method is used for \_\_\_\_\_ range forecasting of weather.
 

a) shore	b) Medium
c) long	d) Daily
- 5) When the isobars are widely spaced the pressure gradient is \_\_\_\_\_.
 

a) gentle	b) Moderate
c) steep	d) Vertical
- 6) The primary purpose of clothing is to protect man against \_\_\_\_\_ and improve his physiological condition.
 

a) humidity	b) Temperature
c) wind	d) Weather
- 7) The \_\_\_\_\_ heat island are formed due to addition of heat from automobile.
 

a) hamlet	b) Rural
c) urban	d) Village
- 8) The grand bank is noted for hazard's to shipping due to \_\_\_\_\_ and icebergs.
 

a) haze	b) Fog
c) mist	d) Smog

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

**08**

- 1) Human body comfort.
- 2) Define urban climate.
- 3) Define atmospheric pressure.
- 4) What is Coriolis effect?
- 5) What is heat island?
- 6) Short range weather forecasting.

- Q.3 Write short notes on any two of the following. 08**
- 1) State the importance of air operation in transportation.
  - 2) Give an account of atmospheric pressure.
  - 3) Explain rotational force.
- Q.4 Write notes on any two of the following. 08**
- 1) Write on historical background of weather forecasting studies.
  - 2) Explain the importance of pressure gradient in atmosphere.
  - 3) Explain urban climate on body comfort.
- Q.5 Answer any one of the following. 08**
- 1) State the importance of air operations marine activates.
  - 2) Importance of weather in transportation.





- Q.3 Write short notes on any two of the following. 08**
- 1) Explain treatment on water pollutant by total dissolved solid (TDS).
  - 2) Write note on carbon compounds as reducing agents.
  - 3) Write note on hydrolysis of  $\text{Na}_2\text{CO}_3$ .
- Q.4 Answer any two of the following questions. 08**
- 1) Write note on types of water pollution.
  - 2) Write note on organic materials in sediments.
  - 3) Write note on Le Chatelier's rule.
- Q.5 Answer any one of the following. 08**
- 1) What carbonate equilibrium? Explain changes in pressure and organic reactivity for acids and bases.
  - 2) What is chemical equilibrium? Explain with examples HCl,  $\text{CO}_2$  in water and Calcium sulphate.

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**B.Sc. (Semester – IV) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Paper – VII)**  
**Fundamentals of Biochemistry (19201446)**

Day & Date: Wednesday, 05-07-2023  
 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 and give equations wherever necessary.

**Q.1 Multiple choice Questions.**

**08**

- 1) Milk sugar contains \_\_\_\_\_.
 

a) mannose	b) Lactose
c) galactose	d) Glucose
- 2) Building blocks of lipids are \_\_\_\_\_.
 

a) amino acids	b) nucleotides
c) fatty acids	d) monosaccharaides
- 3) The simplest amino acid is \_\_\_\_\_.
 

a) proline	b) methionine
c) glycine	d) serine
- 4) How many amino acids make up a protein?
 

a) 10	b) 20
c) 30	d) 40
- 5) Globulins of the blood plasma are responsible for \_\_\_\_\_.
 

a) Defence mechanism	b) blood clotting
c) oxygen transport	d) osmotic balance
- 6) Nucleoside is composed of \_\_\_\_\_.
 

a) a base + a sugar	b) a base + a sugar + phosphate
c) a base + a phosphate	d) none of these
- 7) Left hands DNA is \_\_\_\_\_.
 

a) A- DNA	b) B- DNA
c) C- DNA	d) Z- DNA
- 8) What is nature of enzyme \_\_\_\_\_.
 

a) carbohydrates	b) fats
c) fatty acids	d) protein

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

**08**

- 1) Monosaccharaides
- 2) Significance of lipid
- 3) Immunoglobulins
- 4) Purine and pyrimidine base
- 5) Properties of enzymes
- 6) Conjugated protein

- Q.3 Write short notes on any two of the following. 08**
- 1) Explain replication of DNA.
  - 2) Describe classification of enzymes.
  - 3) Explain denaturation and renaturation of DNA.
- Q.4 Answer any two of the following. 08**
- 1) Describe transcription in prokaryotes.
  - 2) Explain biological significance of carbohydrates.
  - 3) Describe translation in prokaryotes.
- Q.5 Answer any one of the following. 08**
- 1) Explain the structure of DNA.
  - 2) Describe the structure of RNA.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**STATISTICS (Paper - VIII)**  
**Applied Statistics (19201444)**

Day & Date: Thursday, 06-07-2023  
 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) Use of Calculator is allowed.

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

- 1) Long term fluctuations in time series are called \_\_\_\_\_ variations.
  - a) seasonal
  - b) cyclical
  - c) trend
  - d) irregular
- 2) In the theory of time series, variations due to COVID-19 are due to \_\_\_\_\_ variation.
  - a) trend
  - b) cyclical
  - c) seasonal
  - d) irregular
- 3) Level of significance is the probability of \_\_\_\_\_.
  - a) Type I error
  - b) Type II error
  - c) Not committing error
  - d) None of these
- 4) Paired t- test is applicable when the observations in the two samples are \_\_\_\_\_.
  - a) paired
  - b) uncorrelated
  - c) equal in number
  - d) a), b) and c)
- 5) For testing goodness of fit \_\_\_\_\_ test is used.
  - a) Normal
  - b) F
  - c) t
  - d) Chi-square
- 6) In India, the child bearing age is \_\_\_\_\_.
  - a) 20-24 years
  - b) 13-48 years
  - c) 15-49 years
  - d) none of these
- 7) For a continuous distribution Chebyschev's inequality can be stated as  $P[|X - E(X)| \geq C] \leq \frac{V(X)}{C^2}$  provided \_\_\_\_\_.
  - a)  $V(X) < \infty$
  - b)  $V(X) < C^2$
  - c) both a) and b)
  - d) neither a) nor b)
- 8) If  $X_i$  are iid  $N(0,1)$  r.v.s., then limiting distribution of  $Z = \frac{\bar{X}}{\sqrt{n}}$  is  $N(0,1)$ .
  - a)  $\bar{X}$
  - b)  $\frac{\bar{X}}{\sqrt{n}}$
  - c)  $\bar{X}\sqrt{n}$
  - d)  $\bar{X} + \sqrt{n}$

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

08

- 1) Define Alternative Hypothesis.
- 2) Define Type-I error.
- 3) Explain Two-tailed test.
- 4) State Central limit theorem.
- 5) Define CDR.
- 6) Define TFR.

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

08

- 1) Describe the procedure to test for testing population mean  $\mu = \mu_0$  based on t- distribution.
- 2) Describe the large sample test for testing the equality of means  $\mu_1 = \mu_2$ .
- 3) Define 'Time series' and give illustrations of time series from various fields.

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

08

- 1) Define General Fertility Rate (GFR). Also state the merits and demerits of GFR.
- 2) Explain the test procedure for testing the goodness of fit.
- 3) For the distribution with pmf  $p(x) = 2^{-x}$   $X = 1, 2, 3, \dots$ ; prove that Chebychev's inequality gives  $P(|X - 2| \leq 2) \geq \frac{1}{2}$ , while the actual probability is  $\frac{15}{16}$ .

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

08

- 1) For the  $2 \times 2$  contingency table, prove that the chi-square test for independence given

$$\chi^2 = \frac{N(ad - bc)^2}{(a + c)(b + d)(a + b)(c + d)}$$

- 2) Explain the method of simple averages for obtaining indices of seasonal variations. Discuss its merits, demerits.

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**B.Sc. (Semester - IV) (CBCS) Examination- March/April-2023**  
**METEOROLOGY (Paper – IV)**  
**Meteorological Instruments (19201432)**

Day & Date: Friday, 07-07-2023  
 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) While measuring rainfall it is assumed that the \_\_\_\_\_.  
 a) the rainfall is non-uniform over the given region or city.  
 b) the rainfall is uniform over the given region or city.  
 c) the rainfall is uniform over the given observatory.  
 d) the rainfall is uniform over the observatory only.
- 2) Liquid-in-glass thermometer has \_\_\_\_\_.  
 a) wide range  
 b) unlimited range  
 c) no range  
 d) limited range
- 3) On the Fahrenheit scale, the interval between the lower and upper fixed points is divided into \_\_\_\_\_.  
 a) 50 equal parts  
 b) 90 equal parts  
 c) 100 equal parts  
 d) 180 equal parts
- 4) The lines joining places of equal \_\_\_\_\_ are called isobars.  
 a) wind speed  
 b) temperature  
 c) pressure  
 d) humidity
- 5) Aneroid barometer is used to measure \_\_\_\_\_.  
 a) Density of air  
 b) Atmospheric pressure  
 c) Atmospheric temperature  
 d) Humidity of fair
- 6) Air in motion is known as \_\_\_\_\_.  
 a) spinning  
 b) wind  
 c) rotation  
 d) revolution
- 7) A force due to \_\_\_\_\_ brings air-mass in motion.  
 a) Velocity gradient  
 b) Rate of change of force  
 c) Pressure gradient  
 d) Rate of change of displacement
- 8) Heat stored in water vapor is \_\_\_\_\_.  
 a) Specific heat  
 b) Latent heat  
 c) Absolute heat  
 d) Relative heat

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

**08**

- a) What is precipitation?
- b) Differentiate between ordinary rain gauge and self-recording rain gauge.
- c) A doctor measures body temperature of his Patient as 104°F. How much is patient's body temperature in °C?
- d) What is a barometer?

- e) What are advantages of anemograph over an anemometer?
- f) What is humidity?

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

- a) Draw neat diagram of mercury barometer.
- b) Draw neat labelled diagram of dry and wet bulb thermometer.
- c) What is thermocouple?

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

- a) Write a note on "The different temperature scale."
- b) With neat diagram explain construction and working of Thermograph.
- c) Draw neat labelled diagram of Aneroid barometer and describe its constructions and working.

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

- a) With neat diagram explain constructions and working of automatic siphon gauge.
- b) With neat diagram explain constructions and working of cup anemometer.



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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**GEO-CHEMISTRY (Paper-IV)**  
**Chemistry of the Earth (19201420)**

Day & Date: Friday, 07-07-2023  
 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 Multiple choice questions.**

**08**

- 1) Which of the following statements is true about SMOG?
  - a) SMOG is derived from the fog
  - b) SMOG is derived from smoke
  - c) SMOG is derived from the water vapour
  - d) SMOG is derived from the fog and smoke.
  
- 2) Why is organic matter (humus) an important part of soil?
  - a) It helps to improve water infiltration
  - b) It can break down organic pollutants
  - c) It converts nitrogen in the air into nitrates used by plants
  - d) It is rich in nutrients, which is important for fertility
  
- 3) Ionic potential is:
 

a) Charge on the ions	b) Charge multiplied by radius
c) Charge divided by radius	d) Radius divided by charge
  
- 4) Which is the most stable mineral towards weathering?
 

a) Quartz	b) Feldspar
c) Hornblende	d) Olivine
  
- 5) The angle between the bonds joining the hydrogen nuclei to the center of the oxygen atom in a water molecule is:
 

a) 90°	b) 96°
c) 105°	d) 115°
  
- 6) \_\_\_\_ type of clay structure has one tetrahedral layer linked with one octahedral layer.
 

a) Smectite	b) Montmorillonite
c) Kaolinite	d) Soil
  
- 7) Which of the following is the application of isotopes.
  - a) Use of radiogenic isotopes as “clocks” to date the crystallization ages of rocks
  - b) Crystallization ages of meteorites
  - c) The formation and evolution of ancient continental crust
  - d) All the above
  
- 8) The transformation from parent rock to soil is generally accompanied by:
  - a) Decrease in Ca, Mg, Na and K and increase in Si
  - b) Increases in Ca, Mg, Na and K and decrease in Si
  - c) Much loss of Al and Fe
  - d) No change in parent composition

- Q.2 Answer any four of the following.** **08**
- a) Define Secular changes.
  - b) What is soil erosion?
  - c) Write reaction of minerals for 'oxidation' type of chemical weathering.
  - d) What is mean by geochronology?
  - e) List of causes of water pollution.
  - f) Name the types of chemical weathering.
- Q.3 Write short notes on any two of the following.** **08**
- a) Using Eh-pH diagram explain why permanganates are not stable in the geological environment.
  - b) Explain in brief the characteristics of Montmorillonite clay mineral.
  - c) Write note on Soil profile.
- Q.4 Answer any two of the following.** **08**
- a) Write note on Hydrogen ion concentration.
  - b) Explain in the brief carbon 14 method of dating.
  - c) Discuss the geochemical cycle with neat labeled diagram.
- Q.5 Answer any one of the following.** **08**
- a) Define pollution. Explain in brief the types of air pollutions.
  - b) Describe the origin, classification, structural units and chemical composition of clay minerals.



- Q.3 Write short notes on any two of the following.** **08**
- a) Structure of Neuron
  - b) Types of blood cells
  - c) Oral contraceptives
- Q.4 Answer any two of the following.** **08**
- a) Ultra structure of muscle fiber
  - b) IVF
  - c) Disorders of Thyroid
- Q.5 Answer any one of the following.** **08**
- a) Describe structure of synapse and Synaptic transmission.
  - b) Give an account on Menstrual cycle.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Paper - VII)**  
**Differential Equations (19201428)**

Day & Date: Saturday, 08-07-2023  
 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 alternative for each of the following.**

**08**

- 1) The solution of the differential equation  $P^2 + P - 12 = 0$  is \_\_\_\_\_.  
 a)  $(y - 4x - c)(y - 3x - c) = 0$       b)  $(y - 4x - c)(y + 3x - c) = 0$   
 c)  $(y + 4x - c)(y - 3x - c) = 0$       d)  $(y + 4x - c)(y + 3x - c) = 0$
- 2) The solution of the differential equation  $\sin(Px - y) = P$  is \_\_\_\_\_.  
 a)  $y = cx - \sin^{-1} c$       b)  $y = cx + \sin^{-1} c$   
 c)  $y = cx - \sin c$       d)  $y = cx + \sin c$
- 3) If  $2 + 2Px + Qx^2 = 0$  then the one solution of the differential equation.  
 $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = 0$  is  $y =$  \_\_\_\_\_.  
 a)  $e^x$       b)  $e^{-x}$   
 c)  $x$       d)  $x^2$
- 4) In solving the equation  
 $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + QY = R$  by using change of dependent variable method, the complete solution is given by  $y = uv$ , where  $u =$  \_\_\_\_\_.  
 a)  $e^{\frac{1}{2} \int p dx}$       b)  $e^{-\frac{1}{2} \int p dx}$   
 c)  $e^{\int p dx}$       d)  $e^{-\int p dx}$
- 5) A homogeneous linear differential equation can be transformed into a linear differential equation with constant coefficients by using the independent variable from  $x$  to  $z$  by the substitution \_\_\_\_\_.  
 a)  $x = e^{-z}$       b)  $x = e^z$   
 c)  $z = e^x$       d)  $z = e^{-x}$
- 6) The one solution of the equation  
 $x \frac{d^2y}{dx^2} - (2x - 1) \frac{dy}{dx} + (x - 1)y = 0$  is \_\_\_\_\_.  
 a)  $y = x$       b)  $y = -x$   
 c)  $y = e^x$       d)  $y = e^{-x}$
- 7) A differential equation of the type  
 $Pdx + Qdy + Rdz = 0$   
 (where  $P, Q, R$  are functions of  $x, y, z$ ) are called as \_\_\_\_\_.  
 a) Simultaneous differential equation  
 b) Total differential equation  
 c) Homogeneous linear equation  
 d) Linear differential equation

8) The complete solution of the equation

$$\frac{dx}{x} = \frac{dy}{y} = \frac{dz}{z} \text{ is } \underline{\hspace{2cm}}.$$

a)  $xy = c_1, yz = c_2$

b)  $x = c_1y, y = c_2z$

c)  $x + y = c_1, xy = c_2$

d)  $x^2 - y^2 = c_1, x + y = c_2$

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

08

1) Solve  $x^2p^2 + 3xyp + 2y^2 = 0$

2) Solve  $x^2 \frac{d^2y}{dx^2} - 4x \frac{dy}{dx} + 6y = 0$

3) Solve  $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$

4) Solve  $P^2(x^2 - a^2) - 2xyp + (y^2 + a^4) = 0$

5) Test for the integrability.  
 $yzdx + zxdy + xydz = 0$

6) Solve  $\frac{xdx}{y^2z} = \frac{dy}{xz} = \frac{dz}{y^2}$

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

08

1) Solve  $y = 2Px + x^2P^4$

2) Explain the method of solving homogeneous linear equation.

$$x^n \frac{d^n y}{dx^n} + P_1 x^{n-1} \frac{d^{n-1} y}{dx^{n-1}} + \dots + P_{n-1} x \frac{dy}{dx} + P_n y = X$$

(where  $P_1, P_2, \dots, P_n$  are constants and  $X$  is a function of  $x$ )

3) Solve  $\frac{dx}{x(y-z)} = \frac{dy}{y(z-x)} = \frac{dz}{z(x-y)}$

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

08

1) Solve  $xy(y - px) = x + py$

2) Solve  $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} - y = 2 \log(x + 1)$

3) Show that the necessary condition for integrability of the total differential equation  $Pdx + Qdy + Rdz = 0$  is that

$$P \left( \frac{\partial Q}{\partial z} - \frac{\partial R}{\partial y} \right) + Q \left( \frac{\partial R}{\partial x} - \frac{\partial P}{\partial z} \right) + R \left( \frac{\partial P}{\partial y} - \frac{\partial Q}{\partial x} \right) = 0$$

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

08

1) Explain the method of solving the equation

$$\frac{d^2y}{dx^2} + P \frac{dy}{dx} + QY = R \text{ by changing the dependent variable } y \text{ to } V.$$

(where  $P, Q, R$  are the functions of  $x$  only)

2) i) Solve  $x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} - 4y = x^2$

ii) Solve  $\frac{dx}{y^2} = \frac{dy}{x^2} = \frac{dz}{x^2y^2z^2}$

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**BOTANY (Paper-VII)**  
**Plant Physiology (19201401)**

Day & Date: Monday, 10-07-2023  
 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 and give equations wherever necessary.

**Q.1 Multiple choice questions.**

**08**

- 1) \_\_\_\_\_ among the following is Day neutral plant.
 

a) Rice	b) Maize
c) Wheat	d) Cotton
- 2) Mass flow hypothesis was proposed by \_\_\_\_\_.
 

a) Candolle	b) Munch
c) Both a & b	d) Darwin
- 3) \_\_\_\_\_ element is required for chlorophyll synthesis.
 

a) Copper	b) Magnesium
c) Cobalt	d) Chlorine
- 4) In c3 pants \_\_\_\_ is first stable compound.
 

a) OAA	b) PGAL
c) RUDP	d) PGA
- 5) \_\_\_\_\_ is called as power house of cell.
 

a) Collenchyma	b) Ribosome
c) Mitochondria	d) Nucleus
- 6) Photorespiration takes place in \_\_\_\_\_.
 

a) Ribosome	b) Chloroplast
c) Cytoplasm	d) None
- 7) Translocation of organic solvents occur through \_\_\_\_\_.
 

a) Xylem	b) Phloem
c) Fibers	d) none
- 8) Phytochrome exist in \_\_\_\_\_ form.
 

a) Pr	b) Pfr
c) Both a & b	d) Pbr

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

**08**

- 1) Define Photorespiration.
- 2) Draw Calvin cycle.
- 3) Define vernalization.
- 4) Draw well labelled structure of mitochondria.
- 5) Define light & dark reaction.
- 6) What is phloem transport?

- Q.3 Write short notes on any two of following. 08**
- 1) Describe mass flow hypothesis.
  - 2) Describe photosynthetic apparatus.
  - 3) Explain in brief process of vernalization.
- Q.4 Answer any two of the following. 08**
- 1) Write a note on Long Day Plant.
  - 2) Describe CAM pathway.
  - 3) Write a note on photosynthetic pigments.
- Q.5 Answer any one of the following. 08**
- 1) Describe cyclic & non cyclic photophosphorylation.
  - 2) Explain in brief phloem loading & unloading.



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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Paper-VIII)**  
**Abstract Algebra – I (19201429)**

Day &amp; Date: Tuesday, 11-07-2023

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

**Q.1 Choose correct alternatives****08**

- 1) Which of the following is not a group.
  - a)  $\langle \mathbb{Z}, + \rangle$
  - b)  $\langle \mathbb{R}, + \rangle$
  - c)  $\langle \mathbb{N}, + \rangle$
  - d)  $\langle \mathbb{C}, + \rangle$
- 2) The cycle of length \_\_\_\_\_ is called transposition.
  - a) 1
  - b) 2
  - c) 3
  - d) 4
- 3) The value of the expression  $[2] \odot [4]$  in  $\mathbb{Z}_5$  is \_\_\_\_\_.
  - a) [2]
  - b) [4]
  - c) [3]
  - d) [5]
- 4) For Euler's  $\phi$  function  $\phi(41) =$  \_\_\_\_\_.
  - a) 40
  - b) 41
  - c) 42
  - d) 39
- 5) The number of generators of the group  $\mathbb{Z}_{12}$  is \_\_\_\_\_.
  - a) 1
  - b) 2
  - c) 4
  - d) 11
- 6) Every group of order 11 is \_\_\_\_\_.
  - a) Cyclic and abelian
  - b) Cyclic but not abelian
  - c) not cyclic
  - d) none of these
- 7) A homomorphic mapping from  $f: G \rightarrow G'$  is epimorphic if  $f$  is \_\_\_\_\_.
  - a) into
  - b) onto
  - c) one-one
  - d) both one-one onto
- 8) Let  $f: G \rightarrow G'$  be homomorphism then  $\ker f =$  \_\_\_\_\_.
  - a)  $\{x \in G \mid f(x) = e'\}$
  - b)  $\{x \in G \mid f(x) = e\}$
  - c)  $\{x \in G' \mid f(x) = e\}$
  - d)  $\{x \in G' \mid f(x) = x\}$

**Q.2 Solve any four of the following:** **08**

- a) Compute the product of cycles  $(1327)(486)$  that are permutations of  $\{1,2,3,4,5,6,7,8\}$
- b) In a group  $G$  prove that  $(a^{-1})^{-1} = a$
- c) Determine the right cosets of  $\langle [3] \rangle$  in  $Z_{12}$
- d) Solve the equation  $(12)x = (123)$  in  $S_3$
- e) Find order of element of a group  $\{i, -i, 1, -1\}$  under complex multiplication
- f) Show that intersection of any two normal subgroup is normal subgroup

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

- 1) If  $\alpha = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 3 & 2 \end{pmatrix}$  and  $\beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$  is  $S_4$   
compute  $\alpha \circ \beta, \alpha^{-1} \circ \beta^{-1}, \beta \circ \alpha, \beta^{-1} \circ \alpha^{-1}$
- 2) Find the subgroups of  $Z_{12}$  also construct the subgroup lattice.
- 3) show that the function  $f: (R, +) \rightarrow (R, \cdot)$  given by  $f(x) = e^x$  is an isomorphism of group

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

- 1) Show that every subgroup of cyclic group is cyclic.
- 2) Find  $gcd$  of 616 and 427 and express  $(616, 427) = 616x + 427y$
- 3) If  $G = \{0,1,2,3,4,5\}$  and  $+_6$  is addition modulo 6 is binary operation then show that  $(G, +_6)$  is abelian group.

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

- 1) State and prove Lagrange's theorem
- 2) If  $f: G \rightarrow G'$  be onto homomorphism with  $K = \ker f$ , then show that  $\frac{G}{K} \cong G'$

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**BOTANY (Paper-VIII)**  
**EMBRYOLOGY OF ANGIOSPERMS (19201402)**

Day & Date: Wednesday, 12-07-2023  
 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 labelled diagram and give equations wherever necessary.

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

**08**

- 1) The stamens are also known as \_\_\_\_\_.  
 a) Anthers  
 b) pollens  
 c) Sporophylls  
 d) microsporophyll
- 2) The pollen tube of angiosperms contains \_\_\_\_\_.  
 a) 1 - male gamete  
 b) 2- male gametes  
 c) 3- male gametes  
 d) 4- male gametes
- 3) Ovule is attached to the placenta by a small stalk is called \_\_\_\_\_.  
 a) Chalaza  
 b) Raphe  
 c) hilum  
 d) Funiculus
- 4) Orthotropous ovule is \_\_\_\_\_ type of ovule.  
 a) Straight  
 b) Inverted  
 c) Transverse  
 d) Curved
- 5) True endosperm is found in \_\_\_\_\_.  
 a) gymnosperms  
 b) Pteridophyte  
 c) Bryophytes  
 d) angiosperms
- 6) The dispersal of seeds in *Calotropis* occurred by \_\_\_\_\_.  
 a) Wind  
 b) Water  
 c) Air  
 d) Animal
- 7) \_\_\_\_\_ endosperm is characterized by absence of free nuclear divisions.  
 a) cellular  
 b) nuclear  
 c) Helobial  
 d) all of the above
- 8) The entry of pollen tube in ovule through micropyle is called \_\_\_\_\_.  
 a) Misogamy  
 b) chalazogamy  
 c) Porogamy  
 d) Syngamy

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

**08**

- a) Define flower.
- b) Explain Circinotropous ovule.
- c) Define pollination with its types.
- d) Define megasporogenesis.
- e) What is endosperm?
- f) What is seed?

- Q.3 Write short notes on any two of the following. 08**
- a) Structure of tetrasporangiate anther
  - b) Cellular endosperm
  - c) Structure of dicot seed
- Q.4 Answers any two of the following. 08**
- a) State the different agencies involved in pollination.
  - b) Explain the different whorls of flower.
  - c) Describe the development of bisporic embryo sac.
- Q.5 Answers any one of the following. 08**
- a) Describe the mechanism of seed dispersal.
  - b) Explain the flower as modified shoot with suitable examples.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper-VII)**  
**Economic Geography (19201416)**

Day & Date: Thursday, 13-07-2023  
 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 maps and diagrams wherever necessary.  
 4) Use of maps stencil is allowed.

**Q.1 Multiple choice questions.**

**08**

- 1) The national highway No.3 joins: \_\_\_\_\_ -
 

a) Agra with Kolkata	b) Delhi with Ahmedabad
c) Delhi with Mumbai	d) Agra with Mumbai
- 2) GDP means \_\_\_\_\_.
 

a) Gross domestic product	b) Giga domestic product
c) Gross daily product	d) Gram domestic product
- 3) \_\_\_\_\_ is the largest producer of cotton in the world accounting for about 22% of the world cotton production.
 

a) America	b) China
c) India	d) Pakistan
- 4) World Fisheries Day is celebrated on \_\_\_\_\_ November every year by fishing communities across the world.
 

a) 21	b) 11
c) 31	d) 41
- 5) Economic geography is the subfield of \_\_\_\_\_ geography.
 

a) Natural	b) Physical
c) Human	d) None of these
- 6) Electronic city located in \_\_\_\_\_ in India.
 

a) Hyderabad	b) Bangalore
c) Mumbai	d) Kolkata
- 7) Modes of transport include?
 

a) Air & water	b) Road & Rail
c) Cable, Space & Pipelines	d) All of these
- 8) SEZ approvals granted under the SEZ Act \_\_\_\_\_.
 

a) 2000	b) 2005
c) 2010	d) 2015

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

**08**

- a) Concept of Economic Geography
- b) Forestry
- c) Mining
- d) Secondary Activity
- e) Subsistence Agriculture
- f) Technology Parks

- Q.3 Write short notes on any Two of the following. 08**
- a) Fishing
  - b) Tertiary Activity
  - c) SEZ
- Q.4 Answer the any two of the following. 08**
- a) Explain the modes of transport & it's importance in Indian economy.
  - b) Describes Vonthunen land use model.
  - c) What is mean by Agriculture & Explain commercial agriculture pattern.
- Q.5 Answer any one of the following. 08**
- a) Explain the Industrial Location Theory by Alfred Weber.
  - b) Define the Economic Geography & Explain the classification of economic activity.



- Q.3 Write short notes on any Two of the following. 08**
- a) Emitter coupled differential amplifier
  - b) Phase shift oscillator using op-amp
  - c) Current to voltage converter using op-amp
- Q.4 Answer the any two of the following. 08**
- a) Explain Precision half wave rectifier using op-amp.
  - b) Explain current mirror bias circuit.
  - c) Draw the block diagram of op-amp and explain it.
- Q.5 Answer any one of the following. 08**
- a) Explain op-amp as monostable multi vibrator and obtain expression for pulse width.
  - b) Explain voltage to current converter using op-amp.



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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023  
GEOLOGY (Paper – VII)  
Stratigraphy (19201422)**

Day & Date: Friday, 14-07-2023  
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 Select correct one.**

**08**

- 1) The fossils are commonly used for \_\_\_\_\_ the strata.
  - a) Correlation
  - b) Paleoclimate
  - c) Fresh/marine
  - d) All of these
- 2) The major units of the geological time are called \_\_\_\_\_.
  - a) Eras
  - b) Periods
  - c) Epoch
  - d) Stage
- 3) \_\_\_\_\_ is the recent period.
  - a) Proterozoic
  - b) Cambrian
  - c) Ordovician
  - d) Quaternary
- 4) Dharwar and Aravali Groups are in \_\_\_\_\_ Era.
  - a) Quaternary
  - b) Tertiary
  - c) Mesozoic
  - d) Precambrian
- 5) The peninsular India lies to the \_\_\_\_\_ of the plains of Indus and Ganga river system.
  - a) North
  - b) South
  - c) East
  - d) West
- 6) \_\_\_\_\_ system is un fossiliferous.
  - a) Archean
  - b) Gondwana
  - c) Carboniferous
  - d) Cretaceous
- 7) The majority of the Deccan trap flows are \_\_\_\_\_.
  - a) Granite
  - b) Limestone
  - c) Basalt
  - d) Sandstone
- 8) Himalayan mountains were formed due to \_\_\_\_\_ activity.
  - a) Earthquake
  - b) Volcanic
  - c) Tectonic
  - d) None of these

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

**08**

- a) What is lithostratigraphic correlation.
- b) Use of fossils in stratigraphy.
- c) What is chronostratigraphy?
- d) Name the Precambrian succession.
- e) What is index fossil?
- f) Name the rocks in Cuddapah formation.

- Q.3 Write short notes on any two of the following. 08**
- a) Explain Dharwar formations.
  - b) Write Geological Time Scale.
  - c) Explain Triassic of spiti.
- Q.4 Answer any Two of the following. 08**
- a) Explain classification of Delhi super group.
  - b) Explain Cretaceous of Tiruchirapalli.
  - c) Explain Deccan Volcanic province.
- Q.5 Answer any one of the following. 08**
- a) Explain physiographic divisions of India.
  - b) Explain methods of Stratigraphic correlation.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Paper – VII)**  
**Immunology & Medical Microbiology (19201425)**

Day & Date: Friday, 14-07-2023  
 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 the following cells are involved in Cell mediated immunity?
  - a) T cells
  - b) B cells
  - c) Mast cells
  - d) All of the above
- 2) Interferons are associated with \_\_\_\_\_ Infection.
  - a) Bacterial
  - b) Viral
  - c) Fungal
  - d) Protozoal
- 3) Kupffer cells are present in \_\_\_\_\_.
  - a) Stomach
  - b) Liver
  - c) Lung
  - d) Kidney
- 4) How many types are antibodies are there?
  - a) Two
  - b) Three
  - c) Four
  - d) Five
- 5) Vaccination induces type of \_\_\_\_\_ Immunity.
  - a) Natural active
  - b) Natural Passive
  - c) Artificial active
  - d) artificial passive
- 6) \_\_\_\_\_ Antibody is present in secretions?
  - a) IgG
  - b) IgA
  - c) IgD
  - d) IgM
- 7) VDRL stands for \_\_\_\_\_.
  - a) Venereal disease research laboratory
  - b) Video download and rearrangement laboratory
  - c) various diseases research laboratory
  - d) very distant research laboratory
- 8) After collection of blood what should be added to it to avoid coagulation?
  - a) Heparin
  - b) Saline
  - c) Buffer
  - d) NaOH

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

**08**

- a) Acquired immunity- Definition and types.
- b) Define antigen.
- c) Define antibody.
- d) Define in inflammation.
- e) Define agglutination
- f) What are the symptoms of dengue fever?

- Q.3 Write short notes on any two of the following. 08**
- a) Diagnosis of enteric fever.
  - b) Mechanism of innate immunity.
  - c) Immunoprecipitation.
- Q.4 Answer any two of the following. 08**
- a) Elaborate complement fixation test with example.
  - b) What are the factors affecting antigenicity?
  - c) Explain in detail predisposing actors of candidiasis.
- Q.5 Answer any one of the following. 08**
- a) Write a note on ELISA.
  - b) Elaborate five classes of Immunoglobulins.

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Set P

**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**GEOGRAPHY (Paper – VIII)**  
**Environmental Geography (19201417)**

Day & Date: Saturday, 15-07-2023  
 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 Stencils is allowed.

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

- 1) \_\_\_\_\_ is responsible for air pollution.
  - a) Chemical Fertilizers
  - b) Industries
  - c) Cultural Functions
  - d) None of these
- 2) The term Environment means \_\_\_\_\_.
  - a) Region
  - b) Land
  - c) Surrounding
  - d) Area
- 3) The word Ecosystem was coined by \_\_\_\_\_.
  - a) Tansley
  - b) Fosobarg
  - c) Lindeman
  - d) Park
- 4) \_\_\_\_\_ is responsible for soil pollution.
  - a) Industries
  - b) Transportation
  - c) Chemical Fertilizers
  - d) None of these
- 5) Solar energy is used by plants to make food such process is known as \_\_\_\_\_.
  - a) Hydration
  - b) Photosynthesis
  - c) Oxidation
  - d) None of these
- 6) \_\_\_\_\_ is most important organisms for an ecosystem.
  - a) Herbivorous
  - b) Carnivorous
  - c) Green Plants
  - d) Patozoa
- 7) \_\_\_\_\_ gas is responsible for global warming.
  - a) Carbon dioxide
  - b) Carbon monoxide
  - c) Oxygen
  - d) Nitrogen
- 8) Marine life is in danger due to \_\_\_\_\_ pollution.
  - a) Air
  - b) Land
  - c) Water
  - d) Sound

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

- 1) What is environmental Geography?
- 2) What is Ecosystem?
- 3) What is food chain?
- 4) What is Air Pollution?
- 5) What is Soil Pollution?
- 6) What is Global Warming?

- Q.3 Write short notes on any two of the following. 08**
- 1) Acid Rain
  - 2) Desertification
  - 3) Importance of Environmental Geography
- Q.4 Answer any two of the following. 08**
- 1) Scope of the Environmental Geography.
  - 2) Explain the Grassland Ecosystem.
  - 3) Explain the Climate Changes.
- Q.5 Answer any one of the following 08**
- 1) What is Biome? Explain the types of Aquatic Biomes.
  - 2) What is Water Pollution? Explain the causes and effects of Water Pollutions.



- Q.2 Answer any four of the following.** **08**
- 1) Give the important features of memory IC 2764.
  - 2) Define accuracy and resolution of DAC.
  - 3) State the roll of program counter.
  - 4) Write four salient features of 8085 processor.
  - 5) Write the name of ICs
    - i) 74244
    - ii) 74245
    - iii) 74138
    - iv) 74373
- Q.3 Write short notes on any two of the following.** **08**
- 1) Semiconductor memories.
  - 2) 4-bit R-2R ladder network DAC.
  - 3) Demultiplexing of the Address/Data bus.
- Q.4 Answer any two of the following.** **08**
- 1) What is flow chart? Draw three symbols with their meaning.
  - 2) Determine the analog output for 4-bit R-2R ladder network DAC, if 0 = 0V and 1 = 5 V for digital input
    - i) 1110
    - ii) 1010
  - 3) Classify instruction set of 8085 according to the size of instruction with suitable example.
- Q.5 Answer any one of the following** **08**
- 1) What is addressing mode? With suitable example explain different types of addressing mode supported by 8085 processor.
  - 2) Draw the internal block diagram of 8085 processor and explain ALU, and Flag register.



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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Paper - VIII)**  
**Paleontology (19201423)**

Day & Date: Sunday, 16-07-2023  
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

**Q.1 Multiple choice questions:**

**08**

- 1) Fossils are helpful in exploration of \_\_\_\_\_.  
 a) Natural oil deposits                      b) copper deposits  
 c) ground water                                d) mica deposits
- 2) A branch of geology deals with study of fossils with respect to their origin, uses, distribution is called as \_\_\_\_\_.  
 a) Physical geology                            b) Paleontology  
 c) Petrology                                    d) Stratigraphy
- 3) Which of the following suggest modes of preservation?  
 a) Petrification                                b) Mould & casts  
 c) Carbonization                              d) all of these
- 4) Most important conditions of preservation of fossils are \_\_\_\_\_.  
 a) presence of hard parts                    b) immediate burial  
 c) dry climate                                    d) A + B
- 5) Which process of formation of fossils involves molecule by molecule replacement?  
 a) Petrification                                b) Mould & casts  
 c) Carbonization                              d) Imprints
- 6) Conversion of buried plants in to coal by decay and decomposition is called \_\_\_\_\_.  
 a) Petrification                                b) Mould & casts  
 c) Carbonization                              d) all of these
- 7) Remains of ancient organisms preserved in the rocks are called as \_\_\_\_\_.  
 a) Minerals                                      b) Dyke  
 c) Fossils                                        d) Crystals
- 8) Species Nautilus belongs to \_\_\_\_\_ Class.  
 a) Gastropod                                    b) Cephalopoda  
 c) Lamellibranches                            d) none of these

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

**08**

- 1) Define paleontology.
- 2) Name the fossils of trilobites.
- 3) Define suture line in fossil.
- 4) Conditions of fossilization
- 5) Describe physa.

- Q.3 Write short notes on any two of the following. 08**
- 1) Petrification
  - 2) Cardium
  - 3) Goniatite and nautilus
- Q.4 Answer any two of the following. 08**
- 1) Describe the Glossopteris and gangamopteris.
  - 2) Describe the echinoderms.
  - 3) Describe the gastropods.
- Q.5 Answer any one of the following. 08**
- 1) Describe uses of fossils.
  - 2) Describe mode of preservation of fossil.

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**B.Sc. (Semester - IV) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (PAPER-VIII)**  
**Industrial Microbiology (19201426)**

Day & Date: Sunday, 16-07-2023  
 Time: 09:00 AM To 11:00 AM

Max. Marks: 40

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

**Q.1 Multiple choice questions:**

**08**

- 1) During Penicillin fermentation temperature of the system is maintained at \_\_\_\_\_ for optimum production.
 

a) Room temperature	b) 26°C
c) 36°C	d) 46°C
- 2) \_\_\_\_\_ of the following carbohydrates is majorly present in whey.
 

a) Lactose	b) Glucose
c) Fructose	d) Mannose
- 3) \_\_\_\_\_ is the main purpose of strain improvement.
 

a) To increase the productivity	b) Regulating the activity of the enzyme
c) To introduce new genetic properties	d) All of the above
- 4) The recovery of the fermentation products is also called as \_\_\_\_\_.
 

a) upstream processing	b) downstream processing
c) right stream processing	d) left stream processing
- 5) Scale up means \_\_\_\_\_.
 

a) Decreasing the scale of fermentation	b) Increasing the scale of the fermentation
c) Decreasing the rate of agitation	d) Increasing the rate of agitation
- 6) \_\_\_\_\_ of the following is crystallization.
 

a) Solid-solid separation	b) Solid to liquid separation
c) Solid to gas separation	d) Liquid -Gas separation
- 7) Full-form of ATCC is \_\_\_\_\_.
 

a) American Type Culture Collection	b) Automatic Type Counter & Classifier
c) American Type Counter Collection	d) American Type Classifier and Collection

- 8) \_\_\_\_\_ of the following method is not used in isolation and screening of desired microorganisms.
- a) Crowded plate technique
  - b) Auxanographic technique
  - c) Enrichment Culture technique
  - d) Hanging Drop technique

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

**08**

- 1) Name of the organism used for penicillin fermentation.
- 2) Define SCP.
- 3) Enlist industrially important organisms with their products.
- 4) What are the applications of Amylase?
- 5) What are the advantages of continuous culture?
- 6) Define strain improvement.

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

**08**

- 1) Write a short note on use of waste in fermentation media.
- 2) Draw and explain the design of typical bioreactor/Fermenter.
- 3) Give list of various media components used in fermentation.

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

**08**

- 1) Explain primary screening with one suitable example.
- 2) Explain how distillation is used for industrial product recovery.
- 3) Describe methods of preservation of Industrially important micro-organisms.

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

**08**

- 1) Describe the recovery procedure for penicillin from fermented broth.
- 2) Write in detail Industrial production of Alcohol by fermentation.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**ENGLISH (Compulsory)**  
**Literary Mindscapes – I (19201500)**

Day & Date: Sunday, 02-07-2023  
 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 sentence by filling the blanks with the correct answer from the given options. 08**

- 1) What did Jim sell to buy a gift for Della?
  - a) His old house
  - b) His motorbike
  - c) Wedding ring
  - d) Heirloom watch
- 2) What did Phatik lose?
  - a) Cycle
  - b) Pocket
  - c) School text book
  - d) Shoes
- 3) The story 'The Homecoming' ends with \_\_\_\_\_.
  - a) Phatik's death from illness
  - b) Phatik's death in an accident
  - c) Phatik's birth in the hospital
  - d) Phatik's arriving to his village
- 4) What did the poet in 'The Solitary Reaper' carry in his heart?
  - a) The beauty of the Tiger
  - b) The boy's beauty
  - c) The girl's song
  - d) The necklace
- 5) Who snatched the Queen's mirror in 'The Queen's Rival'?
  - a) Her son
  - b) Her daughter
  - c) The King
  - d) The father
- 6) What did the schoolmaster in the poem 'The Village Schoolmaster' love?
  - a) Religious books
  - b) Debate
  - c) Learning
  - d) Gossiping
- 7) The gate \_\_\_\_\_ by the watchman.
  - a) had opened
  - b) was opened
  - c) opened
  - d) has opened
- 8) It is not easy \_\_\_\_\_ the meeting.
  - a) to get rid off
  - b) to tie up
  - c) to send off
  - d) to call off

**Q.2 Write answer in short. (Any 4 out of 6) 12**

- 1) Why was Della sad in the beginning of the story 'The Gift of the Magi'?
- 2) How did Phatik feel arriving at the uncle's house?
- 3) Describe the Reaper in the poem 'The Solitary Reaper'.
- 4) Why is the Queen unsatisfied in 'The Queen's Rival'?
- 5) Describe the character of Schoolmaster in the poem 'The Village Schoolmaster'.
- 6) Where did Della go to buy Jim's gift?

- Q.3 Answer any One of following.** **10**
- 1) What are the benefits of 21<sup>st</sup> century technology?
- OR**
- 2) Write a detailed note on learning and literacy skills.
- Q.4 Describe in detail the four C's. in your own words.** **10**

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**PHYSICS (Special Paper- IX)**

**Mathematical Physics & Statistical Physics (19201511)**

Day &amp; Date: Monday, 03-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

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

**10**

- 1) Integration of a vector along a curve is called \_\_\_\_\_.  
 a) volume integral                      b) closed integral  
 c) line integral                          d) surface integral
- 2) The entropy has its maximum value for thermodynamic assembly in \_\_\_\_\_ state.  
 a) an equilibrium                          b) an inequilibrium  
 c) a normal                                  d) non homogeneous
- 3) Thermodynamics cannot be applied to \_\_\_\_\_ ensemble.  
 a) microcanonical                          b) canonical  
 c) grand canonical                          d) microensemble
- 4) The three coordinates of spherical polar coordinate system are \_\_\_\_\_.  
 a)  $(x, y, z)$                                   b)  $(r, \theta, \phi)$   
 c)  $(r, \theta, z)$                                   d)  $(x, y, \phi)$
- 5) The most probable speed for the molecules in assembly on Maxwell Boltzmann distribution law is \_\_\_\_\_.  
 a)  $v_{mp} = \sqrt{\frac{2KT}{m}}$                                   b)  $v_{mp} = \sqrt{\frac{3KT}{2m}}$   
 c)  $v_{mp} = \sqrt{\frac{Kt}{2m}}$                                   d)  $v_{mp} = \sqrt{\frac{3Kt}{m}}$
- 6) The ratio of most probable speed and average speed of gas molecule is \_\_\_\_\_.  
 a)  $\frac{\sqrt{\pi}}{2}$     b)  $\frac{\sqrt{\pi}}{4}$   
 c) 1    d)  $\pi$
- 7) The Bose-Einstein distribution law is \_\_\_\_\_.  
 a)  $n_i = \frac{g_i}{\varepsilon^\alpha \varepsilon^{u_i/KT} + 1}$                                   b)  $n_i = \frac{g_i}{\varepsilon^\alpha \varepsilon^{u_i/KT} - 1}$   
 c)  $n_i = \frac{g_i}{\varepsilon^\alpha \varepsilon^{u_i/KT}}$                                   d)  $n_i = \frac{g_i}{\varepsilon^\alpha \varepsilon^{u_i}}$





- Q.4 A) Attempt any Two of the following.** **08**
- 1) Obtain the expression for curl of vector field in orthogonal curvilinear coordinates.
  - 2) What are the thermodynamic functions? Express them in terms of Boltzmann partition function.
  - 3) Compare M.B, B.E and F. D. statistics.
- B) Attempt any One of the following** **08**
- 1) If a black body at a temperature  $6174^{\circ}\text{K}$  emits  $4700\text{\AA}$  with maximum energy, calculate the temperature at which it will emit a wavelength of  $1.4 \times 10^{-5} \text{ m}$  with maximum energy.
  - 2) Deduce Green's theorem from Gauss Divergence theorem.
- Q.5 Attempt any Two of the following.** **16**
- a) Derive Plank's radiation formula in terms of frequency and wavelength.
  - b) State and prove Stoke's theorem in vector field.
  - c) Derive an expression for Fermi-Dirac distribution law.







- B) Answer in One sentence. 06**
- 1) Write the name of total root parasite.
  - 2) Write the symbol showing actinomorphic condition of flower in F.F.
  - 3) What is species?
  - 4) Name the place of Indian Botanical Garden.
  - 5) What is the full form of APG?
  - 6) What is the type of fruit in *Citrus*?
- Q.2 Solve any Eight of the following. 16**
- 1) Define habitat.
  - 2) Name the whorls of flower.
  - 3) Define simple fruit with 1 example.
  - 4) Explain synandrous condition of stamen.
  - 5) Write any two types of stipules with example.
  - 6) Name the steps in preparation of herbarium.
  - 7) Write the botanical names of any two plants of family - Annonaceae.
  - 8) Explain the Calyx of family Bignoniaceae.
  - 9) Write the systematic position of family Rubiaceae.
  - 10) Sketch the structure of Orchid flower with proper label.
- Q.3 A) Attempt any Two of the following. 10**
- 1) Write distinguishing characters of family Nyctaginaceae.
  - 2) Write the principles of ICBN.
  - 3) Explain the forms of Polypetalous regular corolla.
- B) Write short note on - 06**
- “Importance of Botanical Gardens”
- Q.4 A) Attempt any Two of the following. 08**
- 1) Write the economic importance of the family Malvaceae.
  - 2) Explain any two modifications of tap roots with examples.
  - 3) Describe Binomial nomenclature of plants.
- B) Describe any four types of Racemose Inflorescence with diagram. 08**
- Q.5 Attempt any Two of the following. 16**
- a) Describe underground modifications of stem.
  - b) Describe Bentham and Hooker’s system of classification.
  - c) Describe the key features of Lead Botanical Garden.



- B) Give One Word answer.** **06**
- 1) Splicing
  - 2) SOS Mechanism
  - 3) Kornberg enzyme
  - 4) DNA ligase
  - 5) Pyrimidine
  - 6) Exon

- Q.2 Solve any Eight of the following.** **16**
- 1) miRNA
  - 2) Activator
  - 3) lac operon
  - 4) tRNA
  - 5) RNA interference
  - 6) R-DNA technology
  - 7) thymine dimer
  - 8) Photoexcision repair
  - 9) Ribosomes in prokaryotes
  - 10) promoter

- Q.3 A) Attempt any Two of the following.** **10**
- 1) Give the structure of RNA polymerase and its role.
  - 2) Explain any two DNA repair mechanisms.
  - 3) Give the steps in rDNA technology.
- B) Write short note on structure of DNA.** **06**

- Q.4 A) Attempt any Two of the following.** **08**
- 1) Describe post transcriptional modifications.
  - 2) What is genetic code, Explain wobble hypothesis?
  - 3) Give salient features of DNA.
- B) Describe DNA replication in prokaryote.** **08**

- Q.5 Attempt any Two of the following.** **16**
- a) Describe translation in eukaryotes.
  - b) Discuss the application of recombinant DNA technology in agriculture and health.
  - c) Describe regulation of gene expression in prokaryotes.







- Q.4 A) Answer the followings (Any two):** **08**
- 1) Show that  $S = \{0,2,4,6,8\}$  is a subring of  $Z_{10}$
  - 2) Let  $V$  and  $W$  be vector spaces over field  $F$  and let  $T, U: V \rightarrow W$  be linear transformation then prove that  $aT + U$  is linear transformation.
  - 3) Let  $V$  be the vector space of polynomial with inner product given by  $\langle f, g \rangle = \int_0^1 f(t)g(t)dt$ . Let  $f(t) = t, g(t) = e^t$ , then find
    - i)  $\|f\|$
    - ii)  $\|g\|$
- B) Let  $U: P_3(R) \rightarrow P_2(R)$  and  $T: P_2(R) \rightarrow P_3(R)$  be the linear transformations** **08**  
 defined by  $U(f(x)) = f'(x)$  and  $T(f(x)) = \int_0^x f(t)dt$ .  
 Let  $\alpha$  and  $\beta$  be the standard ordered bases of  $P_3(R)$  and  $P_2(R)$ . Compute
- 1)  $[T]_{\beta}^{\alpha}$
  - 2)  $[U]_{\alpha}^{\beta}$
- Q.5 Answer the following (Any Two).** **16**
- a) State and prove Dimension Theorem.
  - b) If  $Z_5 = \{0,1,2,3,4\}$  then prove that  $(Z_5, +, \cdot)$  is a field.
  - c) State and prove Cauchy-Schwarz Inequality.





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

- 1) Obtain the MLE of the parameter  $\theta$  based on a r.s. of size  $n$  from Bernoulli Distribution.
- 2) State and prove sufficient condition for consistency for  $\theta$ .
- 3) Find moment estimator of  $\theta$  if 
$$f(x) = \begin{cases} (1 + \theta)X^\theta & ; 0 < X < 1 \\ 0 & ; \text{otherwise} \end{cases}$$

**B) Let  $X_1$  and  $X_2$  is a.r.s. from  $N(\mu, \sigma^2)$  distribution let  $T_1 = \frac{X_1+X_2}{2}, T_2 = \frac{X_1+2X_2}{3}$  08**

Show that  $T_1$  and  $T_2$  are unbiased estimator of  $\mu$  and also find the efficiency of  $T_2$  in relative to  $T_1$ .

**Q.5 Answer the following (Any Two). 16**

**a) Find MLE and Moment estimator of  $\theta$  based on a sample of size  $n$  from**

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

- b) Define Uniformly Minimum Variance Unbiased Estimator (UMVUE) and show that it is unique when it exists.**
- c) State and prove Crammer Rao Inequality.**

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Special Paper- IX)**  
**Economic Geology (19201534)**

Day & Date: Monday, 03-07-2023  
 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.

**Q.1 A) Multiple choice questions. 10**

- 1) Hydrothermal deposits, which are formed at great depths, near the intrusive and within the temperature range of 300°C to 500°C is called \_\_\_\_\_.  
 a) Hypothermal deposits                      b) Mesothermal deposits  
 c) Epithermal deposits                        d) Syngenetic deposits
- 2) Supergene sulphide enrichment zone is found \_\_\_\_\_.  
 a) Above the water table                      b) Below the water table  
 c) Near the ground surface                  d) In oxidizing zone
- 3) The process responsible for the formation of placer deposits is \_\_\_\_\_ concentration.  
 a) Mechanical                                      b) Residual  
 c) Magmatic                                        d) Chemical
- 4) Diamond in kimberlite are good example of \_\_\_\_\_.  
 a) Disseminated deposit                      b) Segregated deposit  
 c) Injected deposit                                d) Pegmatitic deposit
- 5) Which of the following is the highest quality of coal \_\_\_\_\_?  
 a) Lignite    b) Peat  
 c) Anthracite                                        d) Bituminous
- 6) Ingaldhal copper deposits in Karnataka belongs to \_\_\_\_\_ formation.  
 a) Chitradurg                                        b) Peninsular gneissic complex  
 c) Bababudhan                                    d) Sargur group
- 7) The placer deposits along the coastal tract of Maharashtra is \_\_\_\_\_.  
 a) Gold    b) Zircon  
 c) Rutile    d) Ilmenite
- 8) Most of the contact metasomatic deposits are associated with \_\_\_\_\_.  
 a) Batholiths                                        b) Sill  
 c) Dyke    d) Laccolith
- 9) The surficial indicator of the hidden ore deposit is \_\_\_\_\_.  
 a) host rock    b) gossan  
 c) ore mineral                                        d) gauge mineral

- 10) Residual liquid segregation deposits are \_\_\_\_\_ deposits.
- Exogenetic
  - Metasomatic
  - Late magmatic concentration
  - Residual

**B) Answer the following. 06**

- What is skarn?
- What type of deposits the aluminium rich Bauxite is?
- What do you mean by Syngenetic?
- What are Gangue minerals?
- What is Magmatic segregation?
- Explain the reservoir rock in one sentence.

**Q.2 Answer any Eight of the following. 16**

- Define Epigenetic ore deposits.
- Name two endogenous deposits associated with folded regions.
- Name two ore deposits formed by metamorphism.
- Define Alloy.
- Give any two Indian examples of hydrothermal ore deposits.
- Name the types of Magmatic deposits.
- Name the ore minerals of copper metal.
- Define the term Tenor of ores.
- What are fossil fuels?
- Give essential conditions for formation of placer deposits.

**Q.3 A) Attempt any Two of the following: 10**

- What is Magmatic concentration? Explain late magmatic concentration deposits.
- Discuss the occurrence and distribution of manganese deposits of India.
- Explain in brief contact metasomatic deposits with suitable example.

**B) Write short note on mechanical concentration of ore deposits. 06**

**Q.4 A) Attempt any Two of the following: 08**

- Explain the oxidation and supergene enrichment processes of ore deposit with Indian example.
- Discuss the origin and distribution of copper deposits of India.
- Explain the concept and need of conservation of minerals, give examples.

**B) Explain in brief the formation of mineral deposits by sedimentation processes. 08**

**Q.5 Attempt any Two of the following: 16**

- Describe in brief the origin and classification of the coal deposits.
- Discuss the distribution of petroliferous basins of India.
- Discuss any four cavity filling hydrothermal deposits.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY ( Special Paper- IX )**  
**Virology (19201539)**

Day & Date: Monday, 03-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple Choice Questions.**

**10**

- 1) \_\_\_\_\_ is not a characteristic of virus.
  - a) They are obligate intracellular parasite
  - b) They require only living media
  - c) They contain Both DNA and RNA
  - d) They are connecting link between living and non-living
- 2) The virus which has double stranded RNA is \_\_\_\_\_.
  - a) Bunyavirus
  - b) Reovirus
  - c) Calcivirus
  - d) Rhabdovirus
- 3) The basic structural unit of capsid is called as \_\_\_\_\_.
  - a) Peplomer
  - b) Capsomer
  - c) Nucleocapsid
  - d) 20 triangular faces, 30 edges and 12 Corners
- 4) The distinguishing feature of T even coliphages from T odd coliphages is \_\_\_\_\_.
  - a) T even coliphages contains contractile sheath
  - b) T even coliphages contain 5-hydroxymethyl cytosine
  - c) T odd coliphages are complex capsid or Binal symmetry
  - d) Both a and b
- 5) During reproduction (In Attachment process) of T4 bacteriophage \_\_\_\_\_ are required for unfolding of tail fibers.
  - a) Tryptophan
  - b) N formyl Methionine
  - c) Mg<sup>++</sup> and Ca<sup>++</sup> ions
  - d) Both a and c
- 6) Terminal protein of 55k is attached to the 5' end of the DNA of \_\_\_\_\_ virus.
  - a) Influenza
  - b) Adenovirus
  - c) Polio
  - d) Pox
- 7) Antigenic Shift and drift mechanism is occurs in \_\_\_\_\_ Virus
  - a) Polyoma
  - b) SV40
  - c) Influenza
  - d) Adeno
- 8) \_\_\_\_\_ is the property of oncogenic cell.
  - a) Angiogenesis
  - b) Reduced serum requirement
  - c) Loss of Contact Inhibition
  - d) All of the above



- 9) Viruses can be purified through precipitation with \_\_\_\_\_.  
 a) Polyethylene Glycol                      b) Cesium Acetate  
 c) Sucrose    d) Silica gel
- 10) \_\_\_\_\_ is not a method of control of plant virus disease.  
 a) Removal of Source of Infection  
 b) Use of Virus free vegetative stock or disease resistance crop varieties  
 c) Use of Antibacterial Chemicals  
 d) Modified planting and harvesting procedures

**B) Fill in the blanks.**

**06**

- 1) In Virus Enumeration, PFU stands for \_\_\_\_\_.  
 2) Infectious Protein particles are called as \_\_\_\_\_.  
 3) In Lambda phage reproductive cycle \_\_\_\_\_ gene carry out excision and integration of phage DNA into bacterial chromosome.  
 4) Tumor in which tissue cells do not invade surrounding tissues and remain localized as a compact mass is called as \_\_\_\_\_.  
 5) Family name of viruses have suffix \_\_\_\_\_.  
 6) In cultivation of coliphage, Chloroform treatment is given for \_\_\_\_\_.

**Q.2 Solve any eight of the following.**

**16**

- a) Write in short about general properties of the virus.  
 b) ICTV (International committee) system of virus classification.  
 c) Write in short about general characters of viroid.  
 d) Draw neat labeled diagram of HIV virus.  
 e) Antigenic shift and drift process.  
 f) Write in short about Pock assay.  
 g) Describe in short about general characters of the prions.  
 h) Write in short about LHT system of Viral Classification.  
 i) Write in short about Symptoms of the cauliflower mosaic disease.  
 j) Differentiate between benign and malignant tumor.

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Describe in detail about one step growth experiment.  
 2) Define oncogenic virus and explain in detail about types of oncogenic virus.  
 3) Write in detail about techniques used for isolation of animal virus.

**B) Describe in short about Lytic cycle of T4 Bacteriophage.**

**06**

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

**08**

- 1) Write in short about structure of TMV, and symptoms for Mosaic Disease of Tobacco.  
 2) Write in short about structure of Adeno virus.  
 3) Write in short about characteristics of the cancerous cell.

**B) Define cancer and write in detail about hypothesis of cancer.**

**08**

**Q.5 Attempt any two of the following.**

**16**

- a) Describe in detail about the purification techniques for viruses.  
 b) Write in detail about the prevention and control of plant viral diseases.  
 c) Define temperate phage and write in detail about the lysogenic cycle of Lambda Phage.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS (Special Paper- IX)**  
**Linear Integrated Circuits and Applications (19201548)**

Day & Date: Monday, 03-07-2023  
 Time: 03:00 PM To 6:00 PM

Max. Marks: 80

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

**Q.1 A) Chose correct alternative and rewrite the sentence.****10**

- 1) \_\_\_\_\_ process is use for growing a single crystal silicon structure upon an original silicon substrate.
  - a) Oxidation
  - b) Lithography
  - c) Ion Implantation
  - d) Epitaxial
- 2) \_\_\_\_\_ is used to rectify the voltage below 0.6 volts.
  - a) tunnel diode
  - b) varicap
  - c) precision diode
  - d) photo diode
- 3) Another name for the all-pass filter is \_\_\_\_\_.
  - a) notch filter
  - b) delay filter
  - c) band stop filter
  - d) band pass filter
- 4) LM 317 is a \_\_\_\_\_ voltage regulator IC.
  - a) adjustable positive
  - b) fixed positive
  - c) adjustable negative
  - d) fixed negative
- 5) When PLL is locked, VCO frequency \_\_\_\_\_ the input frequency.
  - a) more than
  - b) less than
  - c) equal to
  - d) less than or equal to
- 6) If the control voltage to a VCO increases, the output frequency is \_\_\_\_\_.
  - a) decreases
  - b) increases
  - c) remain same
  - d) none of these
- 7) In an IC regulator \_\_\_\_\_ is used to increase the current capacity of the regulator.
  - a) reference voltage source
  - b) protection circuits
  - c) error amplifier
  - d) pass transistor
- 8) In \_\_\_\_\_ filter the minimum attenuation is occur at the center frequency.
  - a) wide band stop
  - b) wide band pass
  - c) narrow band pass
  - d) high pass
- 9) \_\_\_\_\_ circuit is used to add a desired dc level to the output voltage.
  - a) Peak detector
  - b) Clipper
  - c) Clamper
  - d) S/H

- 10) An integrated circuit offers \_\_\_\_\_.  
 a) low power consumption      b) improved performance  
 c) high speed                      d) all of these

- B) Define the following terms. 06**  
 1) Monolithic IC  
 2) Precision rectifier  
 3) Cut off frequency of filter  
 4) Line regulation  
 5) Low pass filter  
 6) VCO

- Q.2 Solve any Eight of the following. 16**  
 a) State the disadvantages of an integrated circuit.  
 b) Define active peak detector.  
 c) Define center frequency of band pass filter.  
 d) Write the important features of the three terminal regulators.  
 e) Draw the circuit diagram of PLL as frequency demodulator.  
 f) Calculate the value of IC resistance having sheet resistance of  $200 \Omega / \text{sq.}$  and has aspect ratio  $L:W=20:1$ .  
 g) Draw the diagram of sample and hold circuit.  
 h) State the advantages of active filters.  
 i) Calculate cut off frequency of second order high pass filter if  $R_1 = R_2 = 1 \text{ K}\Omega$  and  $C_1 = C_2 = 0.1 \mu\text{F}$ .  
 j) Draw the basic block diagram IC regulator.

- Q.3 A) Attempt any Two of the following. 10**  
 1) Explain fabrication process of monolithic capacitor.  
 2) Explain working of positive clipper.  
 3) Explain second order Butterworth Low pass filter.  
**B) Explain basic operation of voltage-controlled oscillator. 06**

- Q.4 A) Attempt any Two of the following. 08**  
 1) Explain working of adjustable positive regulator.  
 2) Explain working of PLL as a frequency multiplier.  
 3) Explain working of antilog amplifier.  
**B) Explain working of PLL with its transfer characteristics. 08**

- Q.5 Attempt any Two of the following. 16**  
 a) Explain working F to V converter by using IC LM 331.  
 b) Give the classification of filter and explain wide band pass filter.  
 c) Explain in brief the steps involved in the fabrication of IC.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Special Paper- IX)**  
**Visual Programming Using C# (19201543)**

Day & Date: Monday, 03-07-2023  
 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 right indicate full marks.  
 4) Use of log table and calculator is allowed.

**Q.1 A) Multiple choice questions.**

**10**

- 1) The \_\_\_\_\_ is not types of access modifiers in C#.
  - a) internal protect
  - b) external protect
  - c) Internal
  - d) Protect
- 2) An Event has \_\_\_\_\_ as default return type.
  - a) String
  - b) Integer
  - c) Double
  - d) No return type for events
- 3) What is the Difference between Convert.ToInt32 and Int.Parse?
  - a) Both are Same
  - b) Convert.ToInt32 Can't Handle Null Values
  - c) Int.Parse Can't Handle Null values
  - d) Both can Handle Null Values
- 4) If you don't want to override the method then \_\_\_\_\_ keyword is used.
  - a) Final
  - b) Sealed
  - c) Constant
  - d) Virtual
- 5) Defining two methods with the same name but with different parameters are called as \_\_\_\_\_.
  - a) Overloading
  - b) Overriding
  - c) Static
  - d) Virtual
- 6) A delegate defines \_\_\_\_\_.
  - a) a means of passing arrays into methods
  - b) a class that encapsulates methods
  - c) a substitute for an inherited method
  - d) None of these
- 7) Every class directly or indirectly extends from the \_\_\_\_\_ class.
  - a) System
  - b) Object
  - c) Drawing
  - d) Console
- 8) Exception objects are derived from the \_\_\_\_\_ class.
  - a) Exception
  - b) Error
  - c) Event
  - d) System
- 9) In C# Thread.Sleep(time) measures time in \_\_\_\_\_.
  - a) Seconds
  - b) Milliseconds
  - c) Nanoseconds
  - d) Minutes

10) The \_\_\_\_\_ classes provide the operation of reading from and writing to the console in C#.NET.

- a) System.InOutput
- b) System.Array
- c) System.ReadLine
- d) System.Console

**B) Fill in the blanks.**

**06**

- 1) In windows application, SDI stands for \_\_\_\_\_.
- 2) The \_\_\_\_\_ number of input methods defined by the stream method Console.In in C#.NET.
- 3) The \_\_\_\_\_ keyword is used to refer parent class constructor to child class constructor.
- 4) The \_\_\_\_\_ modifier is used to define a class which does not have objects of its own but acts as a base class for its subclass.
- 5) The \_\_\_\_\_ event occurs when a key is pressed while the form has the focus.
- 6) Form's \_\_\_\_\_ property is used to specify the position on the screen.

**Q.2 Solve any Eight of the following.**

**16**

- a) What is assembly and its types?
- b) What is manage code?
- c) What is garbage collection?
- d) How to create textbox control at runtime? Give example.
- e) What is enumeration data type? Give example.
- f) What is difference between method overloading and method overriding?
- g) What is abstract class with example?
- h) What is indexer?
- i) What is use of property? How to write read only property.
- j) What is use of menu control? How to create menu?

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) What is thread synchronization? Explain with example.
- 2) What is stream class? Write a program to copy one file into another file.
- 3) Explain container control group with example.

**B) What are different parameter passing technique in c#? Explain with example.**

**06**

**Q.4 A) Attempt any Two of the following.**

**08**

- 1) Explain value type and reference type in detail.
- 2) Write windows application for basic arithmetic operation.
- 3) What is boxing and unboxing? Explain with example.

**B) What is delegate and its types? Explain anonymous delegate with example.**

**08**

**Q.5 Solve any Two of the following.**

**16**

- a) What is operator overloading? Write a program to overload any two comparison operator.
- b) What is custom exception? Explain how to create custom exception with example.
- c) What is interface? Explain interface with example.



- B) Answer the following.** **06**
- 1) What is superconductor?
  - 2) State Widmann-Franz relation.
  - 3) Define unit cell.
  - 4) What is valence band?
  - 5) State Bragg's law of diffraction.
  - 6) State any two properties of metals.
- Q.2 Solve any eight of the following.** **16**
- a) What are ferromagnetic domains?
  - b) Define space lattice & basis.
  - c) State two properties of reciprocal lattice.
  - d) Define fermi energy.
  - e) Define co-ordination number.
  - f) Draw the plane in cubic system whose miller Indices are  $\langle 2,2,2 \rangle$ .
  - g) What is forbidden energy gap.
  - h) State any two applications of superconductors.
  - i) Write any two properties of ferromagnetic materials.
  - j) Give relation between transition temperature  $T_c$  & critical field  $H_c$  for a superconductor.
- Q.3 A) Attempt any two of the following.** **10**
- 1) Explain types I & type II superconductors.
  - 2) Explain Fermi-Dirac distribution function of free electrons.
  - 3) Explain hysteresis in ferromagnetic materials.
- B) Write short note on hall effect.** **06**
- Q.4 A) Attempt any two of the following.** **08**
- 1) State & explain Meissner effect in superconductivity.
  - 2) Write short note on ferrites.
  - 3) In NaCl crystal ( $a = 2.814 \text{ \AA}$ ) the first order reflection is observed from plane (1,0,0) by using X ray beam of wave-length  $0.75 \text{ \AA}$ . Calculate the angle of diffraction.
- B) Describe Kronig-Penney model in detail.** **08**
- Q.5 Attempt any two of the following.** **16**
- a) Derive Bragg's law in reciprocal lattice.
  - b) Explain seven crystal systems.
  - c) Explain Sommerfeld's model of metal & derive an expression for energy of free electron.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Special Paper- X)**  
**Inorganic Chemistry X (19201507)**

Day & Date: Tuesday, 04-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Select the most correct alternative. 10**

- 1) The excess of nitrogen fertilizers leads to \_\_\_\_\_ problems.
  - a) pest
  - b) Growth
  - c) fruiting
  - d) Flowering
- 2) The nutrients which are used by field crops in very small quantities are known as \_\_\_\_\_ plant nutrients.
  - a) major
  - b) Minor
  - c) normal
  - d) Less
- 3) A substance which poisons the activity of catalyst is \_\_\_\_\_.
  - a) promoter
  - b) Inhibitor
  - c) auto-catalyst
  - d) induced catalyst
- 4) The enzyme which can catalyse the conversion of glucose to ethanol is \_\_\_\_\_.
  - a) maltase
  - b) invertase
  - c) zymase
  - d) urease
- 5) The main function of myoglobin is to \_\_\_\_\_.
  - a) transport O<sub>2</sub>
  - b) transport CO<sub>2</sub>
  - c) store O<sub>2</sub>
  - d) store CO<sub>2</sub>
- 6) Major metal present in human body is \_\_\_\_\_.
  - a) Mg
  - b) Na
  - c) K
  - d) Ca
- 7) In fast breeder reactor \_\_\_\_\_ material is used.
  - a) Fissile
  - b) Fertile
  - c) Radioactive
  - d) all of these
- 8) \_\_\_\_\_ are used in tracer technique.
  - a) radio isotopes
  - b) Non radioactive metals
  - c) non metals
  - d) transition elements
- 9)  $\Delta t = \frac{\Delta o}{\Delta o}$ 
  - a) 0.6
  - b) 0.45
  - c) 1.5
  - d) 0.4
- 10) According to MOT, in octahedral complexes \_\_\_\_\_ orbitals are non bonding MOs.
  - a) a<sub>1g</sub>
  - b) t<sub>1u</sub>
  - c) t<sub>2g</sub>
  - d) e<sub>g</sub>



- B) Fill in the blanks.** **06**
- 1) According to CFT, bonding between metal and ligand is 100% \_\_\_\_\_.
  - 2) The isotope emitting radioactivity is called as \_\_\_\_\_ isotope.
  - 3)  ${}_7\text{N}^{14} + {}_1\text{H}^1 \rightarrow \text{_____} + {}_2\text{He}^4$ .
  - 4) The geometry of deoxyhaemoglobin is \_\_\_\_\_.
  - 5) A reaction in which catalyst and reactants are present in gaseous state is called \_\_\_\_\_ catalysis.
  - 6) Urea contains \_\_\_\_\_ % nitrogen.

- Q.2 Solve any EIGHT of the following.** **16**
- a) What is positive catalysis? Give example.
  - b) What is the function of calcium in living being?
  - c) Draw the shapes of d - orbitals.
  - d) What are limitations of CFT?
  - e) What is projectile capture reaction?
  - f) What is artificial transmutation?
  - g) Explain the use of radioisotope for chemical investigation.
  - h) What are qualities of ideal fertilizers?
  - i) Mention the types of fertilizers.
  - j) Advantages of complex fertilizers.

- Q.3 A) Attempt any TWO of the following.** **10**
- 1) What are the characteristics of catalysts?
  - 2) What is crystal field splitting? Explain it for tetrahedral complex with suitable example.
  - 3) Write a short note on oxygen binding curves.
- B) What is chain reaction? Explain uncontrolled chain reaction.** **06**

- Q.4 A) Attempt any TWO of following.** **08**
- 1) What are superphosphates? Give advantages of superphosphates.
  - 2) Give the factors affecting crystal field splitting.
  - 3) What is Jahn - Teller Distortion theorem?
- B) What is catalysis? Explain adsorption theory of catalysis. Give any two industrial applications of catalysis.** **08**

- Q.5 Attempt any TWO of the following.** **16**
- a) On the basis of MO diagram compare  $[\text{FeFe}_6]^{3-}$  complex with  $[\text{Fe}(\text{CN})_6]^{3-}$  Complex.
  - b) What is a nuclear reaction? Discuss in detail nuclear fusion reaction.
  - c) Give the function, structure and working of haemoglobin.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**BOTANY (Special Paper- X)**  
**Genetics (19201502)**

Day & Date: Tuesday, 04-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple choice questions.**

**10**

- 1) As per Mendel, the character that expressed in F1 generation is called \_\_\_\_ character.
  - a) Recessive
  - b) Dominant
  - c) co dominant
  - d) Inhibitory
- 2) The phenotypic ratio of monohybrid cross is \_\_\_\_\_.
  - a) 1:2:1
  - b) 3:1
  - c) 1:3
  - d) 2:1:1
- 3) The term linkage was coined by \_\_\_\_\_.
  - a) Correns
  - b) Mendel
  - c) Morghan
  - d) De Vries
- 4) Crossing over occurs in the \_\_\_\_\_ stage.
  - a) Leptotene
  - b) Pachytene
  - c) Anaphase
  - d) Diakinesis
- 5) Haemophilia is more common in males because it is a \_\_\_\_\_.
  - a) dominant character carried by X chromosome
  - b) dominant character carried by Y chromosome
  - c) recessive character carried by X chromosome
  - d) recessive character carried by Y chromosome
- 6) The chromosome responsible for the determination of sex are called \_\_\_\_\_.
  - a) Autosomes
  - b) Allosomes
  - c) Alleles
  - d) Lysosomes
- 7) The trait which shows continuous variation is called \_\_\_\_\_.
  - a) genetic disorder
  - b) phenotypic variation
  - c) quantitative trait
  - d) qualitative trait
- 8) When two or more nonallelic gene pairs affect the same character in the same way, it is called \_\_\_\_\_.
  - a) polygenic inheritance
  - b) Pleiotropy
  - c) monogenic inheritance
  - d) Mendelian inheritance
- 9) Cytoplasmic inheritance is due to \_\_\_\_\_.
  - a) only plastid
  - b) only mitochondria
  - c) only chloroplast
  - d) mitochondria, chloroplast and cytoplasmic particles.



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Special Paper - X)**  
**Principles of Genetics (19201521)**

Day &amp; Date: Tuesday, 04-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

**Q.1 A) Select the correct alternative from the following. 10**

- 1) The genetic interaction occur is between \_\_\_\_\_ allelomorphs of a single type of gene.
  - a) Two
  - b) Three
  - c) Four
  - d) None of these
- 2) In inter genic genetic interaction the \_\_\_\_\_ genes located on the same or different chromosomes.
  - a) Non-Homologous
  - b) Homologous
  - c) Polylogues
  - d) none of these
- 3) The gene is a \_\_\_\_\_ determine.
  - a) Chemical
  - b) Physical
  - c) Prelogical
  - d) None
- 4) The enzymes are \_\_\_\_\_ determined by gene.
  - a) Protein
  - b) Carbohydrate
  - c) Fat
  - d) None
- 5) Each cellular chemical reaction involves step wise conversion of our substance called \_\_\_\_\_.
  - a) Precursor
  - b) Epistatic gene
  - c) Hypostatic gene
  - d) None
- 6) Originally a gene or locus was termed which suppressed or masked the arbor of gene at another locus, it termed as \_\_\_\_\_.
  - a) Suppressor gene
  - b) Hypostatic gene
  - c) Homologous gene
  - d) None of these
- 7) The Dominant Epistatic Ration is \_\_\_\_\_.
  - a) 12:3:1
  - b) 9:3:4
  - c) 9.3:3:1
  - d) None
- 8) The two independent pairs of genes have interacted in the production of phenotypic trait. There genes are called \_\_\_\_\_.
  - a) supplementary gene
  - b) Lethal gene
  - c) Complementary gene
  - d) None
- 9) The ratio of supplementary gene modified in \_\_\_\_\_.
  - a) 9 : 3 : 14
  - b) 3 : 1
  - c) 2 : 1 : 1
  - d) None

- 10) Both dominant alleles are present together complement each other called as \_\_\_\_\_
- a) Complementary gene                      b) Homologous gene  
c) Epistatic gene                              d) None

**B) Fill in the blanks/definitions/one sentence answer/one word/give the name/predicate. 06**

- 1) In certain cases two pairs of genes determined the same phenotype by \_\_\_\_\_.
- 2) The alternative forms of same gene influenced on same trait is called \_\_\_\_\_.
- 3) Crossing variations of the gene are known as \_\_\_\_\_.
- 4) Multiple alleles occurs more than \_\_\_\_\_ genes.
- 5) The tendency of genes to stay together in a chromosome is called \_\_\_\_\_.
- 6) The exchange of chromosome between non sister chromatids form gametes is called \_\_\_\_\_.

**Q.2 Solve any Eight of the following. 16**

- 1) Mutation
- 2) Down syndrome
- 3) Turner's syndrome
- 4) Extra chromosomal inheritors
- 5) Chromosomal mapping
- 6) Chromosomal abbreviations
- 7) Transformation
- 8) Conjugation
- 9) Polygenic in heritances
- 10) Lethal genes

**Q.3 A) Attempt any Two of the following. 10**

- 1) Explain the cyclogical detection of crossing over.
- 2) What is differences between linkage map & Chromosomal map?
- 3) X and Y chromosomes

**B) Describe mechanism of sex determination. 06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) Describe sex determinations in Drosophila.
- 2) Types of sex chromosomal mechanism.
- 3) Describe crossing over.

**B) Explain Transposons in bacteria. 08**

**Q.5 Attempt any Two of the following. 16**

- a) Explain polygenic inheritance.
- b) Describe Transduction with examples.
- c) Sex determination in Human





B) Prove the polar form of Cauchy Riemann equations 06

$$\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta} \text{ and } \frac{\partial v}{\partial r} = -\frac{1}{r} \frac{\partial u}{\partial \theta} \text{ where } r = \sqrt{x^2 + y^2}, \theta = \tan^{-1} \left( \frac{y}{x} \right)$$

Q.4 A) Attempt any two of the following. 08

- 1) State and prove Cauchy fundamental theorem.
- 2) Prove that an analytic function with constant modulus is constant.
- 3) Prove that if  $f(z)$  be a function such that for some positive integer  $m$ , a value  $\phi(z_0)$  exist with  $\phi(z_0) \neq 0$  such that the function  $\phi(z) = (z - z_0)^m f(z)$  is analytic at  $z_0$  Then  $f$  has a pole of order  $m$  at  $z_0$ .

B) State and prove Cauchy's Residue Theorem. 08

Q.5 Attempt any Two of the following. 16

a) State and prove sufficient condition for  $f(z)$  to be analytic.

b) Evaluate  $\int_0^{2+i} z^2 dz$  along

- i) the line  $x = 2y$
- ii) the lines from 0 to 2 to  $2 + i$
- iii) the lines from 0 to  $i$  to  $2 + i$
- iv) along the parabola  $2y^2 = x$

c) Prove that if  $\lim_{z \rightarrow a} (z - a)f(z) = A$ , and if  $C$  is an arc

$\theta_1 \leq \theta \leq \theta_2$  of the circle  $|z - a| = r$  then  $\lim_{r \rightarrow 0} \int_C f(z) dz = iA(\theta_2 - \theta_1)$



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**B.Sc. (Semester – V) (New) (CBCS) Examination: March/April-2023**  
**STATISTICS (Special Paper - X)**  
**Probability Distributions (19201529)**

Day & Date: Tuesday, 04-07-2023  
 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) Select the most correct alternative 10**

- 1) 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)  $\beta_1 < 0, \beta_1 = 3$
- 2) If an exponential r.v. is truncated below 10 then  $E_r(X) =$  \_\_\_\_\_.
  - a) Equal to
  - b) less than 10
  - c) greater than 10
  - d) 0.1
- 3) If  $X$  is a  $N(\mu, \sigma^2)$  r.v. then \_\_\_\_\_ is lognormal r.v.
  - a)  $e^x$
  - b)  $e^{-x}$
  - c)  $\log(X)$
  - d) none of these
- 4) The support of a r.v.  $X$  following normal distribution truncated below 0 is \_\_\_\_\_.
  - a)  $-\infty$  to 0
  - b) 0 to  $\infty$
  - c)  $-\infty$  to  $\infty$
  - d)  $-1$  to 1
- 5) If  $X$  and  $Y$  are two i.i.d.  $LN(\mu, \sigma^2)$  r.v.s. then distribution of  $\frac{x}{y}$  is \_\_\_\_\_.
  - a) cauchy
  - b) Normal
  - c) lognormal
  - d) bivariate normal
- 6) If  $X$  follows  $W(\alpha, \beta)$  then  $(X/\beta)^\alpha$  follows \_\_\_\_\_.
  - a) Exponential (1)
  - b) Cauchy (0,1)
  - c) Laplace ( $\alpha, \beta$ )
  - d) Lognormal
- 7) If  $X$  is Cauchy ( $\mu, \lambda$ ) then  $P(\mu - \lambda < x < \mu + \lambda)$  is \_\_\_\_\_.
  - a) 0.25
  - b) 0.50
  - c) 0.75
  - d) 1
- 8) If a r.v.  $X$  is truncated below  $k$  then  $P(|X| < k)$  is \_\_\_\_\_.
  - a)  $2P(X < k)$
  - b)  $P(X > k)$
  - c) 1
  - d) 0
- 9) If  $(X, Y) \sim BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  then the conditional distribution of  $Y$  given  $X = x$  is \_\_\_\_\_ distribution.
  - a) Normal
  - b) bivariate normal
  - c) Lognormal
  - d) Cauchy

10) If  $X$  follows Logistic  $(\mu, \sigma)$  then standard logistic distribution is \_\_\_\_\_

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

**b) Attempt the following. 06**

- 1) Let  $X \sim N(\mu, \sigma^2)$  is truncated below 0, what is  $P(X > 0)$ ?
- 2) Define Cauchy distribution.
- 3) Define Laplace distribution  $L(\mu, \lambda)$ .
- 4) If  $(X, Y) \sim BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  write the pdf of  $(X + Y)$ .
- 5) If  $X \sim \text{lognormal}(\mu, \sigma^2)$  write the expressions for  $E(X)$ .
- 6) Define Pareto distribution with parameters  $(\alpha, \beta)$ .

**Q.2 Answer any eight of the following. 16**

- a) If a r.v.  $X$  has truncated  $P(\lambda = 2)$  distribution, truncated at  $X = 0$  then write its p.d.f.
- b) State the C.D.F. of a Cauchy distribution with parameters  $(\mu, \lambda)$
- c) If  $X$  is a non-negative r.v. such that  $Y = \log(X)$  is  $N(0, 1)$  then write the p.d.f. of  $X$ .
- d) State the additive property of Cauchy distribution.
- e) Obtain m.g.f. of Laplace distribution with parameters  $(\mu, \lambda)$ .
- f) Find mean of lognormal distribution with parameters  $(\mu, \sigma^2)$ .
- g) Define power series distribution.
- h) Find mean of Pareto  $(\alpha, \beta)$  distribution.
- i) Write the joint p.d.f. of bivariate normal distribution.
- j) Let  $(X, Y)$  be  $BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  then state mean of distribution of  $(X | Y = y)$

**Q.3 a) Attempt any two of the following. 10**

- 1) State and prove the relationship between Cauchy and student's distribution.
- 2) If  $X \sim \text{lognormal}(0, 1)$  find mean and variance of  $X$ .
- 3) If  $X \sim \text{binomial}(n, p)$ , truncated at  $X = 0$  find mean of  $X$ .

**b) Define  $BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  distribution. State the distribution of  $aX + bY + c$  where  $a, b$  &  $c$  are real numbers. 06**

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

- 1) Define Weibull distribution with parameters  $(\alpha, \beta)$  and find its mean.
- 2) Show that Poisson distribution is a particular case of power series distribution.
- 3) Find the distribution of ratio of two independent S.N.Vs.

**b) Obtain C.D.F. of Weibull distribution with parameters  $(\alpha, \beta)$ . 08**

**Q.5 Attempt any Two of the following. 16**

- a) Let  $X$  be a Logistic random variable with parameters  $(\mu, \sigma)$  obtain mean of  $X$ .
- b) If  $X$  is a Laplace  $(\mu, \lambda)$  r.v. the find C.D.F. of  $X$  and second quartile.
- c) Let  $(X, Y)$  is  $BN(\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$  then find the m.g.f. of  $(X, Y)$ .

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023  
GEOLOGY (Special Paper - X)  
Hydrogeology (19201535)**

Day & Date: Tuesday, 04-07-2023  
Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Rewrite the sentence by filling the blanks with the correct answer from the given options. 10**

- 1) A rock or sediment that both stores and transmits a significant amount of water is called an \_\_\_\_\_.
  - a) aquifer
  - b) Aquiclude
  - c) aquitards
  - d) None of these
- 2) The vadose zone of groundwater refers to the \_\_\_\_\_.
  - a) saturated zone
  - b) unsaturated zone
  - c) zone in which water is drawn upward from the water table by capillary action
  - d) None of these
- 3) Which of the following deposits will probably provide the best groundwater supply?
  - a) Loess
  - b) till
  - c) Alluvium
  - d) lake clay
- 4) Groundwater that is in direct vertical contact with the atmosphere through open pores of an aquifer is called \_\_\_\_\_.
  - a) Confined
  - b) unconfined
  - c) Perched
  - d) artesian
- 5) The capacity of a rock to transmit water through its pores is called \_\_\_\_\_.
  - a) Porosity
  - b) void ratio
  - c) Permeability
  - d) flow
- 6) Which of the following usually has the highest porosity?
  - a) Gravel
  - b) sand
  - c) Clay
  - d) silt
- 7) Study of water cycle is part of \_\_\_\_\_.
  - a) Remote sensing
  - b) Petrology
  - c) Hydrogeology
  - d) surface runoff.
- 8) Porosity of rock promotes \_\_\_\_\_.
  - a) Infiltration
  - b) transpiration
  - c) Precipitation
  - d) cone of depression
- 9) Transpiration takes place from \_\_\_\_\_.
  - a) Soil
  - b) ground
  - c) ice body
  - d) vegetation

- 10) Primary porosity of \_\_\_\_\_ is more.
- |              |              |
|--------------|--------------|
| a) Sandstone | b) limestone |
| c) Basalt    | d) granite   |

**B) Answer the following. 06**

- 1) Define Specific yield?
- 2) Define secondary porosity.
- 3) Define retention capacity.
- 4) Define piezometric surface.
- 5) Define unconfined aquifer.
- 6) Define a confined aquifer.

**Q.2 Write answers to any eight of the following. 16**

- a) What is meteoric water?
- b) What is hydrogeology?
- c) What is a perched aquifer?
- d) What is a perched water table?
- e) What is Transmissivity?
- f) What is an aquifer?
- g) What is an overflowing well?
- h) What is a recharge zone?
- i) What is the water cycle?
- j) What is a basin divide?

**Q.3 A) Attempt any Two of the following. 10**

- 1) Describe the Gravity Spring. Draw figure?
- 2) Explain the zone of aeration and draw its diagram.
- 3) Describe the perched aquifer. Draw figures.

**B) Describe the significance of linear features in aerial photographs w.r.t. groundwater. 06**

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

- 1) Describe the relation of nature of slope for its significance of groundwater.
- 2) Describe the secondary porosity with examples.
- 3) Describe the groundwater significance of shale and sandstone rocks.

**B) Describe the relation of nature of bed for its significance of groundwater. 08**

**Q.5 Attempt any Two of the following. 16**

- a) Explain the relation of rock textures w.r.t. to groundwater porosity and transmissivity.
- b) Define watershed. Explain its types & elements. Draw figures of watershed.
- c) Explain the confined aquifer Draw its diagram.



- 10) In carbon cycle flow of energy is \_\_\_\_\_.
- |                  |                 |
|------------------|-----------------|
| a) Bidirectional | b) Linear       |
| c) Cyclic        | d) Irreversible |

**B) Give Definition. 06**

- 1) Green manure
- 2) Rhizosphere
- 3) Pesticide
- 4) Nitrification
- 5) Ammonification
- 6) Plant Pathogen

**Q.2 Solve any Eight of the following. 16**

- a) What are the sources of Sulphur in atmosphere?
- b) What is town compost?
- c) What are Biofertilizers.
- d) Write common symptoms of whip smut of sugarcane.
- e) Enlist two pesticide degrading bacteria.
- f) Define term 'Canker'.
- g) Give examples of Genetically modified plants.
- h) What are Phosphate Solubilizing Bacteria (PSB)?
- j) Define Nitrate reduction.
- k) Define Ammensalism.

**Q.3 A) Attempt any Two of the following. 10**

- 1) Application of Biotechnology in Agriculture.
- 2) Explain in detail process of vermicomposting.
- 3) Explain Carbon cycle in nature.

**B) Write a Short note on Nitrogen Cycle. 06**

**Q.4 A) Attempt any Two of the following. 08**

- 1) Write a note on biochemistry of cellulose degradation.
- 2) Write in brief soil as an ecosystem.
- 3) Explain various control measures of plant-diseases.

**B) Describe Azo and Rhizo Biofertilizers. 08**

**Q.5 Attempt any Two of the following. 16**

- a) Discuss in detail causative agent, symptoms and control of Oily spots of pomegranate.
- b) Write an essay on pesticide degradation.
- c) Bioinsecticides – *Bacillus thuringiensis*.







**Q.5 Attempt any two of the following.**

**16**

- a) Give the classification of instruction set of  $\mu\text{C}8051$ . Explain at least one instruction from each category with suitable example.
- b) Write an Assembly Language Program to serially transmit PORT-0 data at a baud rate of 4800. Assume crystal frequency of 11.0592 MHz.
- c) Explain with suitable block diagram, the architecture of  $\mu\text{C} 8051$ .

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Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Special Paper - X)**  
**Core Java (19201544)**

Day & Date: Tuesday, 04-07-2023  
 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 correct alternatives.****10**

- 1) Size of float in Java is \_\_\_\_\_.
  - a) 32
  - b) 64
  - c) 92
  - d) All of these
- 2) \_\_\_\_\_ invented Java programming language.
  - a) James Bond
  - b) Bjarne Stroustrup
  - c) James Gosling
  - d) None of these
- 3) \_\_\_\_\_ keyword is used to extend the interface.
  - a) super
  - b) final
  - c) extends
  - d) implements
- 4) \_\_\_\_\_ is used to compile, debug and execute the java programs?
  - a) JVM
  - b) JDK
  - c) JDB
  - d) JRE
- 5) In a Java thread can be created \_\_\_\_\_.
  - a) extending class
  - b) implementing interface
  - c) both a and b
  - d) none of these
- 6) \_\_\_\_\_ keyword is used to define interface.
  - a) extend
  - b) implements
  - c) interface
  - d) class
- 7) Which layout used to arrange the components in a line one after the other?
  - a) FlowLayout
  - b) BorderLayout
  - c) GridLayout
  - d) GridBackLayout
- 8) JVM stands for Java Virtual Method.
  - a) False
  - b) True
- 9) \_\_\_\_\_ is a feature of a Java.
  - a) architecture natural
  - b) dynamic
  - c) object oriented
  - d) All of these



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**PHYSICS (Special Paper – XI)**  
**Classical Mechanics (19201513)**

Day & Date: Wednesday, 05-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple choice questions.**

**10**

- 1) The total energy of a system of coupled pendulums is \_\_\_\_\_.
  - a) Only kinetic
  - b) Kinetic energy is always half of potential energy
  - c) Partly kinetic and partly potential
  - d) Only potential
- 2) A rigid body have \_\_\_\_\_ degree of freedom.
  - a) one
  - b) two
  - c) three
  - d) six
- 3) Hamilton's principle is \_\_\_\_\_ principle.
  - a) differential
  - b) integral
  - c) derivative
  - d) none
- 4) The deflection of missile is maximum at \_\_\_\_\_.
  - a) north pole
  - b) equator
  - c) tropic of Capricorn
  - d) tropic of cancer
- 5) A non-holonomic constrain may be expressed in the form of \_\_\_\_\_.
  - a) Equality
  - b) Inequality
  - c) Vector
  - d) None of these
- 6) The maximum horizontal distance covered by projectile is \_\_\_\_\_.
  - a) range of projectile
  - b) flight of projectile
  - c) trajectory of projectile
  - d) altitude of projectile
- 7) The number of independent variable for a free particle in space are \_\_\_\_\_.
  - a) N
  - b) 2N
  - c) 3N
  - d) zero
- 8) The rocket works on principle of conservation of \_\_\_\_\_.
  - a) Linear momentum
  - b) Mass
  - c) Energy
  - d) Angular momentum
- 9) The direction of cyclone in southern hemisphere is \_\_\_\_\_.
  - a) towards right
  - b) towards left
  - c) clockwise
  - d) anticlockwise

- 10) The antisymmetric mode has \_\_\_\_\_ frequency than that of symmetric mode.
- |                 |             |
|-----------------|-------------|
| a) Lower        | b) Higher   |
| c) Much smaller | d) Moderate |

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**

- 1) Give two examples for conservative force fields.
- 2) To and from motion about equilibrium position is called \_\_\_\_\_ motion.
- 3) State the Chasle's theorem on the discussion of Euler's theorem.
- 4) Write the expression for acceleration of Atwood's machine.
- 5) The path of a particle is \_\_\_\_\_ when it is moving under constant conservative force field.
- 6) If the amplitude of oscillations remains the same then the motion is called \_\_\_\_\_.

**Q.2 Solve any Eight of the following. 16**

- 1) What is pseudo force? Give example.
- 2) Give the characteristics of inertial frame of reference.
- 3) Write the importance of Lagrangian formulation over Newtonian formulation.
- 4) A sling carrying a stone in a force free space with an angular velocity 4 rad/s produces centripetal acceleration 144 rad/s<sup>2</sup>. Calculate the radius of the circle intercepted by sling?
- 5) What is the concept of center of mass?
- 6) What are constraints? Give example.
- 7) Explain the formation of cyclones.
- 8) State Euler's theorem.
- 9) What is rigid body? Give example.
- 10) Define degrees of freedom. How much degree of freedom for four particles moving freely in plane?

**Q.3 A) Attempt any two of the following. 10**

- 1) State and prove conservation theorem for energy of a particle.
- 2) A body is dropped from a height of 100 m from rest at latitude  $\phi = 45^\circ$ . Calculate the horizontal eastward deflection of the body. ( $\omega = 7.29 \times 10^{-5}$  rad/s).
- 3) Show that the shortest distance between any two points in a plane is along a straight line passing through them.

**B) Write note on generalized coordinates. 06**

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

- 1) Obtain Lagrange's equation from D'Alembert's principle.
- 2) State and explain Hamilton's principle.
- 3) State and prove conservation theorem for angular momentum of system of particles.

**B) A bullet collides to a fixed block as shown in following figure. The 08**

interaction time of bullet with the block is 0.2 second. If the velocity of the bullet is 250 m/s after collision, find the resistance of the block to the bullet (in terms of force). (Given, initial velocity of bullet is 500 m/s, mass of the bullet is 200g, and weight of the block is 8 kg)

**Q.5 Attempt any two of the following.**

- a)** Derive Euler's equations of motion of a rigid body.
- b)** What are symmetric and antisymmetric mode of oscillations? Obtain equations of motion of two coupled simple pendulums in terms of normal coordinates.
- c)** State Hamilton's principle and obtain Euler-Lagrangian equation from it.

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Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Special Paper-XI)**  
**Organic Chemistry (19201508)**

Day & Date: Wednesday, 05-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Write the correct alternative for each of the following** **10**

- 1) The  $M^+$  and  $M+2$  peaks with same intensity are observed due to presence of isotope of \_\_\_\_\_ of the following.
 

a) Br	b) Cl
c) C	d) H
- 2) \_\_\_\_\_ type of species are detected in mass spectrometer.
 

a) Negatively charged	b) Positively charged
c) Free radicals	d) Neutral
- 3) The potential energy of cyclohexane is maximum in \_\_\_\_\_ conformation.
 

a) Boat	b) Twist boat
c) Chair	d) Half chair
- 4) According to Baeyer, the stability of cycloalkanes \_\_\_\_\_ with increase in ring size.
 

a) Increases	b) Decreases
c) Does not change	d) Anything can happen
- 5) The number of fundamental modes of vibrations in Benzene are \_\_\_\_\_.
 

a) 10	b) 12
c) 6	d) 30
- 6) In NMR spectroscopy \_\_\_\_\_ radiations are used.
 

a) UV	b) IR
c) Radiofrequency	d) Visible
- 7) Which of the following compound has chemical shift value more than 10?
 

a) Alcohol	b) Aldehyde
c) Carboxylic acids	d) Esters
- 8) Diethyl malonate on hydrolysis gives \_\_\_\_\_.
 

a) Acetic acid	b) Succinic acid
c) Malonic acid	d) Oxalic acid
- 9) When methylene group is \_\_\_\_\_ to two carbonyl groups it is said to be active methylene group.
 

a) Alpha	b) Beta
c) Gamma	d) Delta





**Q.5 Attempt any Two of the following.**

- 1) Explain Baeyer's strain theory and its limitations.
- 2) Starting from ethyl acetoacetate how will you synthesize
  - 1) 2- methyl EAA
  - 2) n- Butyric acid
  - 3) Succinic acid
  - 4) Glutaric acid
- 3) An organic compound A [ $C_3H_6O$ ] which is a ketone reacts with another compound B [ $C_4H_7O_2Br$ ] and metallic zinc and dry ether to give the compound C [ $C_7H_{13}O_3ZnBr$ ], Compound C on hydrolysis with HCl gives a  $\beta$  - hydroxy ester D [ $C_7H_{14}O_3$ ]. Compound D on further hydrolysis gives E [ $C_5H_{10}O_3$ ] which is readily dehydrated on heating to form  $\alpha, \beta$  - unsaturated acid. What are A, B, C, D and E? Write reactions and name of the reaction.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**BOTANY (Special Paper - XI)**  
**Molecular Biology (19201503)**

Day & Date: Wednesday, 05-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple choice questions.**

**10**

- 1) In lac operon, lac-Z gene is responsible for synthesis of \_\_\_\_\_ enzyme.
  - a) Permease
  - b) Transacetylase
  - c) Beta galactosidase
  - d) Amylase
- 2) In lac operon, lac-A gene is responsible for synthesis of \_\_\_\_\_ enzyme.
  - a) Permease
  - b) Transacetylase
  - c) Beta galactosidase
  - d) Amylase
- 3) In lac operon, i gene is responsible for synthesis of \_\_\_\_\_ protein.
  - a) Inducer
  - b) Promoter
  - c) Repressor
  - d) Inhibitor
- 4) Prokaryotes have \_\_\_\_\_ transcription.
  - a) Polycistronic
  - b) Monocistronic
  - c) Polymorphic
  - d) None of these
- 5) During translation, first amino acid added is \_\_\_\_\_.
  - a) Arginine
  - b) Proline
  - c) Tyrosine
  - d) Methionine
- 6) B-form of DNA has \_\_\_\_\_ type of helix sense.
  - a) Right handed
  - b) Left handed
  - c) Half left handed
  - d) Half right handed
- 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) 5 Carbon Sugar
  - b) Phosphate groups
  - c) Nitrogen base
  - d) all of these
- 9) When the nitrogen base combine with sugar molecule, it is known as \_\_\_\_\_.
  - a) nucleosides
  - b) Nucleotides
  - c) nucleus
  - d) Biomolecule

- 10) A nucleotide is derived from nucleoside by addition of \_\_\_\_\_ acid.
- a) amino
  - b) Phosphoric
  - c) nucleic
  - d) Thymic

**B) Fill in the blanks.****06**

- 1) \_\_\_\_\_ discovered purine and pyrimidine bases in nucleic acids.
- 2) DNA & RNA both are made up of \_\_\_\_\_.
- 3) The nucleotides are bonded to form a helical backbone structure made up of \_\_\_\_\_ primary nucleobases.
- 4) Adenine combine with Thymine by \_\_\_\_\_ hydrogen bonds.
- 5) At low temperature DNA is reconstructed, this phenomenon is known as \_\_\_\_\_.
- 6) The chromosomal DNA replication occurs only once during \_\_\_\_\_ of cell cycle.

**Q.2 Solve any Eight of the following.****16**

- 1) Define Translation.
- 2) Define Transcription.
- 3) Enlist the types of DNA.
- 4) Enlist the types of RNA.
- 5) Enlist the enzymes involved in DNA replication.
- 6) Draw a neat labelled diagram structure of DNA (Watson and Crick model).
- 7) Define Prokaryotes.
- 8) Define Eukaryotes.
- 9) What are the heat shock proteins?
- 10) What is renaturation of DNA?

**Q.3 A) Attempt any Two of the following.****10**

- 1) Comment up on structure of RNA.
- 2) Comment up on types of DNA.
- 3) Comment up on steroids and peptide hormones of Eukaryotes.

**B) Short note.****06**

Explain in brief Synthesis of DNA (Kornberg's discovery).

**Q.4 A) Attempt any Two of the following.****08**

- 1) What are transcription factors in Eukaryotes?
- 2) Explain in brief structure of Ribosome.
- 3) Explain in brief Watson and Crick model of DNA.

**B) Explain DNA as the carrier of genetic information with the help of Griffith's experiment.****08****Q.5 Attempt any Two of the following.****16**

- a) Explain regulation of lactose metabolism in *E. coli*.
- b) Explain the post-translational modifications of proteins
- c) Explain replication of DNA in prokaryotes and eukaryotes.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Special Paper XI)**  
**Endocrinology (19201522)**

Day & Date: Wednesday, 05-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Rewrite the following sentences choosing correct answer from given alternatives. 10**

- 1) Deficiency of insulin causes a disease called \_\_\_\_\_.  
 a) Diabetics mellitus                      b) Goiter  
 c) Cretinism                                  d) Addison
- 2) Adrenaline hormone is secreted by \_\_\_\_\_ gland.  
 a) Parathyroid                                b) Adrenal  
 c) Thyroid                                      d) Pineal
- 3) The thyroid gland is situated in the \_\_\_\_\_ region of body.  
 a) Neck    b) Oral  
 c) Abdominal                                  d) Thorax
- 4) In man, dietary requirement of iodine is approximately \_\_\_\_\_ mg/week.  
 a) 1    b) 2  
 c) 1.5    d) 0
- 5) The synthesis and release of thyroxin hormone is under the control of \_\_\_\_\_ hormone from pituitary gland.  
 a) ACTH                                         b) FSH  
 c) MSH    d) TSH
- 6) \_\_\_\_\_ disease is caused by over secretion of thyroid gland.  
 a) Diabetics mellitus                        b) Exothermic goiter  
 c) Conn's                                        d) Idiots
- 7) \_\_\_\_\_ endocrine gland is situated on the thyroid gland.  
 a) Parathyroid                                 b) Adrenal  
 c) Thyroid                                        d) Thymus
- 8) Ovulation is chiefly performed by \_\_\_\_\_.  
 a) ADH    b) LH  
 c) Estrogen                                     d) Relaxin
- 9) Hormone secreting cells of a testis are \_\_\_\_\_.  
 a) Follicular cells                             b) Spermatocytes  
 c) Leydig cells                                 d) Cells of tunica albuginea
- 10) Corpus luteum is found in \_\_\_\_\_.  
 a) Kidney                                        b) Testis  
 c) Ovary                                         d) Pituitary

- B) Give the answer in one sentence. 06**
- 1) TSH is secreted by \_\_\_\_\_.
  - 2) What is the function of Thyroxin hormone?
  - 3) The blood calcium level is lowered by deficiency of which hormone.
  - 4) Islets of Langerhans produces
  - 5) Hormones are chemical messengers secreted by
  - 6) Sertoli cells are present in \_\_\_\_\_.

- Q.2 Solve any eight of the following. 16**
- 1) Testicular torsion
  - 2) Hypogonadism
  - 3) Feedback mechanism
  - 4) GnRH
  - 5) Neurosecretions
  - 6) Polycystic ovarian syndrome
  - 7) Acromegaly
  - 8) Functions of MSH
  - 9) Endocrine glands
  - 10) Islets of Langerhans

- Q.3 A) Attempt any Two of the following. 10**
- 1) Describe the hormonal control of testicular activity.
  - 2) Describe the hormones of anterior lobe of pituitary gland.
  - 3) Give in brief the neurohormones and neurosecretions.

- B) Short note. 06**  
Give brief account of structure of pituitary gland its hormones and functions.

- Q.4 A) Attempt any Two of the following. 08**
- 1) Describe the mechanism of hormonal action at cellular level and its regulation.
  - 2) Write an account on female sex hormone and its regulation.
  - 3) Describe location, structure of pineal gland and its functions.

- B) Explain what is placenta and placental disorders. 08**

- Q.5 Attempt any Two of the following. 16**
- a) Describe the hormones of neurohypophysis.
  - b) Describe classification of hormone with reference to their chemical nature.
  - c) Describe the Ovarian cancer.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Special Paper - XI)**  
**Real Analysis (19201526)**

Day & Date: Wednesday, 05-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

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

**10**

- 1) Which of the following is one-one function
  - a)  $f(x) = x^2, -\infty < x < \infty$
  - b)  $f(x) = e^x, -\infty < x < \infty$
  - c)  $f(x) = e^{x^2}, -\infty < x < \infty$
  - d) All of these
- 2) The set E of even positive integers is \_\_\_\_\_.
  - a) Finite
  - b) Uncountable
  - c) Countable
  - d) Non – denumerable
- 3) For  $f: \mathbb{R} \rightarrow \mathbb{R}$  and  $g: \mathbb{R} \rightarrow \mathbb{R}$ , if  $f(x) = 3x - 1$  and  $g(x) = x^2 + 1$  then \_\_\_\_\_.
  - a)  $f \circ g = g \circ f$
  - b)  $f \circ g \neq g \circ f$
  - c)  $f \circ f = g \circ f$
  - d)  $g \circ g = f \circ g$
- 4) Which of the following is correct for any two non-empty set A and B?
  - a)  $A - B = B - A$
  - b)  $A - B = A' \cap B$
  - c)  $(A \cup B) - (A \cap B) = (A - B) \cup (B - A)$
  - d)  $(A \cap B) - (A \cup B) = (A - B) \cup (B - A)$
- 5) The limit of sequence  $S_n = \{(-1)^n\}_{n=1}^{\infty}$  is \_\_\_\_\_.
  - a) 1
  - b) -1
  - c) 0
  - d) Not exist
- 6) Consider the following statements \_\_\_\_\_.
  - I) Every bounded sequence is convergent
  - II) Every convergent sequence is bounded; then
  - a) Both I) and II) are true
  - b) Both I) and II are false
  - c) Only I) is true
  - d) Only II) is true
- 7) The sequence  $\{x^n\}$  is \_\_\_\_\_ if \_\_\_\_\_.
  - a) Converges to one,  $0 < x < 1$
  - b) Converges to zero,  $0 < x < 1$
  - c) Converges to one,  $0 < x < \infty$
  - d) Converges to zero,  $0 < x < \infty$
- 8) The series  $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^P}$  converges if \_\_\_\_\_.
  - a)  $P > 1$
  - b)  $P < 1$
  - c)  $P = 1$
  - d) All of these



**Q.4 A) Attempt any Two of the following.** **08**

- 1) If  $f: A \rightarrow B$  and  $X \subset B, Y \subset B$  then prove that  

$$f^{-1}(X \cap Y) = f^{-1}(X) \cap f^{-1}(Y)$$
- 2) If  $\{S_n\}$  and  $\{t_n\}$  are bounded sequences of real numbers then prove  

$$\liminf_{n \rightarrow \infty} (S_n + t_n) \geq \liminf_{n \rightarrow \infty} S_n + \liminf_{n \rightarrow \infty} t_n$$
- 3) Prove that if  $\sum a_n$  converges absolutely, then the series  $\sum a_n$  convergent but not conversely.

**B) State and prove Demorgan's Laws.** **08**

**Q.5 Attempt any Two of the following.** **16**

- a) Define countable set and show that the set of all rational number is countable. Also show that the set of rational number in  $[0,1]$  is countable.
- b) Prove that a sequence  $\{S_n\}$  of real number is convergent if and only if it is Cauchy sequence.
- c) Define alternating series and show that if  $\{a_n\}_{n=1}^{\infty}$  is sequence of positive numbers which is non-increasing and  $\lim_{n \rightarrow \infty} a_n = 0$  then the alternating series

$$\sum_{n=1}^{\infty} (-1)^{n+1} a_n \text{ is convergent.}$$



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**STATISTICS (Special Paper - XI)**  
**Sampling Techniques (19201530)**

Day & Date: Wednesday, 05-07-2023  
 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.  
 3) Use of log table and calculators is allowed.

**Q.1 A) Choose the correct alternative. 10**

- 1) Sampling frame is a term used for \_\_\_\_\_.
  - a) a list of random numbers
  - b) a list of voters
  - c) a list of sampling units of a population
  - d) none of the above
- 2) The discrepancy between estimate and population parameter is known as \_\_\_\_\_.
  - a) human error
  - b) sampling error
  - c) non-sampling error
  - d) none of these
- 3) Under proportional allocation the size of the sample from each stratum depends on \_\_\_\_\_.
  - a) Total sample size
  - b) Size of the stratum
  - c) Population size
  - d) All the above
- 4) The total number of possible samples of size  $n$ , drawn from population size  $N$  by SRSWOR is \_\_\_\_\_.
  - a)  $n$
  - b)  $N$
  - c)  $Nn$
  - d)  $N^n$
- 5) In presence of linear trend \_\_\_\_\_ method is more efficient.
  - a) Stratified
  - b) Systematic
  - c) SRSWOR
  - d) SRSWR
- 6) Systematic sampling means \_\_\_\_\_.
  - a) Selection of  $n$  contiguous units
  - b) Selection of  $n$  units situated at equal distances
  - c) Selection of  $n$  largest units
  - d) Selection of  $n$  middle units in a sequence
- 7) Probability of selection of varies at each subsequent draw in \_\_\_\_\_.
  - a) SRSWOR
  - b) SRSWR
  - c) both (a) and (b)
  - d) neither (a) nor (b)
- 8) How many types of allocation are in common use?
  - a) One
  - b) Two
  - c) Three
  - d) Four
- 9) Circular systematic sampling is used when \_\_\_\_\_.
  - a)  $N$  is a multiple of  $n$
  - b)  $N$  is a whole number
  - c)  $N$  is not divisible by  $n$
  - d) None of the above

- 10) Sampling errors can be reduced by \_\_\_\_\_.
- choosing a proper probability sampling
  - selecting a sample of adequate size
  - using a suitable formula for estimation
  - all the above

**B) Define the following. 06**

- Sample
- Population
- Sampling unit
- Sampling frame
- Random sampling
- Auxiliary variable

**Q.2 Solve any Eight of the following. 16**

- Define sampling error.
- Give a real-life situation where stratified sampling is used.
- State characteristics of a good questionnaire.
- Give a real-life situation where cluster sampling is used.
- Define non-random sampling.
- What is meant by Neyman allocation.
- Give a real-life situation where systematic sampling is used.
- State the advantages of sampling method over census method.
- State the objectives of a sample survey.
- Define census method.

**Q.3 A) Attempt any Two of the following. 10**

- Explain sampling for proportion, Obtain its unbiased estimator for population proportion.
- Describe, in brief the cluster sampling.
- Find under what condition ratio estimate is more efficient than SRS.

**B) Write a short note on a stratified random sampling. 06**

**Q.4 A) Attempt any Two of the following. 08**

- Explain regression estimators of population mean.
- Describe systematic sampling procedure.
- Show that ratio estimator is biased.

**B) Describe the idea of two-stage and multistage sampling in details. 08**

**Q.5 Attempt any Two of the following. 16**

- Discuss in details about the determination of the sample size.
- In presence of linear trend of the form  $Y_i = a + bi$ ;  $i = 1, 2, \dots, N$ , compare SRSWOR, Stratified random sampling and systematic sampling.
- With usual notations prove that Neyman's allocation has better precision than proportional allocation; and also prove that proportional allocation has better precision than SRS.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Special Paper - XI)**  
**Applied Geology – Engineering Geology (19201536)**

Day & Date: Wednesday, 05-07-2023  
 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.****10**

- 1) Which of the following has definite surface of failure?
  - a) Flowage
  - b) Subsidence
  - c) Sliding
  - d) All of these
- 2) Rock types and geological structures can be studied using \_\_\_\_\_.
  - a) electrical resistivity
  - b) rock core drilling
  - c) geophysical survey
  - d) field mapping
- 3) A subsurface rock body of light density gives \_\_\_\_\_ gravity anomaly.
  - a) High/positive
  - b) low/negative
  - c) neutral
  - d) none of these
- 4) Geophones are used \_\_\_\_\_ in geophysical exploration method.
  - a) Gravity survey
  - b) Magnetic survey
  - c) Seismic survey
  - d) Electrical resistivity survey
- 5) At the construction stage what type of task is undertaken by the engineering geologist?
  - a) The geologist plots topographic, geological features and geologically weaknesses at the site
  - b) The geologists perform core logging
  - c) The geologists perform geophysical surveys
  - d) The geologists prepare regional geological and structural maps
- 6) What is the maximum compressive force expressed per unit area, which a stone can withstand without rupturing?
  - a) Shear strength
  - b) Tensile strength
  - c) crushing strength
  - d) Bending strength
- 7) Pick the rock which is objectionable for use in moist conditions.
  - a) Granite
  - b) Marble
  - c) Gabbro
  - d) Limestone
- 8) Gradation of soil occurs in \_\_\_\_\_ soils.
  - a) residual
  - b) Transported
  - c) both (a) and (b)
  - d) neither (a) nor (b)









- 10) Hall effect transducer is used in the measurement of \_\_\_\_\_.  
a) magnetic field                      b) IR radiations  
c) Vibrations                              d) light intensity

**B) Answer in one sentence/ fill in the blanks/ definitions/ one word answer.      06**

- 1) What is active transducer?
- 2) Give the full-form of RVDT.
- 3) Name any two light sensitive transducers.
- 4) What is optocoupler?
- 5) Give the principle of transduction.
- 6) What is precision?

**Q.2 Solve any Eight of the following.      16**

- 1) Explain the basic need of measurement.
- 2) Define sensor and transducer. Give basic difference between them.
- 3) Explain the principle of operation of resistive transducer.
- 4) What is hall effect? Explain in short.
- 5) Give the principle of operation of capacitive transducer.
- 6) Explain the need of system calibration.
- 7) Explain the principle of operation of inductive transducer.
- 8) What is meant by static and dynamic characteristics of the sensors.
- 9) Give the construction of solenoid.
- 10) What is smart sensor? Give any one example of smart sensor.

**Q.3 A) Attempt any Two of the following.      10**

- 1) Discuss the selection criterion for transducers.
- 2) Explain piezoelectric transducer.
- 3) Explain the construction and operation of electromagnetic relay.

**B) Write a note on LVDT.      06**

**Q.4 A) Attempt any Two of the following.      08**

- 1) Write a short note on carbon microphone.
- 2) Give classification of transducers with example.
- 3) What is RTD? Explain.

**B) Discuss the static and dynamic characteristics of a measurement system.      08**

**Q.5 Attempt any Two of the following.      16**

- a) Draw the block diagram of a measurement system and explain each block.
- b) Explain thermocouple transducer in detail.
- c) Discuss variable area and variable permittivity type capacitive transducer.



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**Computer Science (Special Paper XI)**  
**Operating System (19201545)**

Day & Date: Wednesday, 05-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple choice questions.**

**10**

- 1) The operating system where fixed time slot is allocated to each active process is \_\_\_\_\_.
  - a) real time O.S.
  - b) multiprogramming O.S.
  - c) batch O.S.
  - d) time-sharing O.S.
- 2) A program in execution is called \_\_\_\_\_.
  - a) Process
  - b) Instruction
  - c) Procedure
  - d) Function
- 3) Interval between the time of submission and completion of the job is called \_\_\_\_\_.
  - a) Waiting time
  - b) turn-around time
  - c) Throughput
  - d) response time
- 4) FIFO scheduling is \_\_\_\_\_.
  - a) Preemptive scheduling
  - b) Non- preemptive scheduling
  - c) Deadlock scheduling
  - d) None of these
- 5) "Throughput" of a system is \_\_\_\_\_.
  - a) Number of programs processed by it per unit time
  - b) Number of times the program is invoked by the system
  - c) Number of requests made to a program by the system
  - d) None of the above
- 6) Virtual memory is \_\_\_\_\_.
  - a) simple to implement
  - b) used in all major commercial operating systems
  - c) less efficient in utilization of memory
  - d) useful when fast I/O devices are not available
- 7) Process is called as a passive entity \_\_\_\_\_.
  - a) True
  - b) False
- 8) There is a guarantee that the critical tasks are completed in given amount of time. That is called as \_\_\_\_\_.
  - a) Hard Real time systems
  - b) soft real time system
  - c) Real time systems
  - d) None of the above
- 9) Virtual memory can be implemented with \_\_\_\_\_.
  - a) Segmentation
  - b) Paging
  - c) Both a and b
  - d) None of the above

- 10) \_\_\_\_\_ is a technique of temporarily removing inactive programs from the memory of computer system.
- a) Swapping
  - b) Spooling
  - c) Semaphore
  - d) Scheduler

**B) Fill in the blank.****06**

- 1) The priority scheduling algorithm suffers by \_\_\_\_\_.
- 2) The FIFO algorithm \_\_\_\_\_.
- 3) The degree of Multiprogramming is controlled by \_\_\_\_\_.
- 4) The banker's algorithm is used for deadlock \_\_\_\_\_.
- 5) Memory management technique in which system stores and retrieves data from secondary storage for use in main memory is called \_\_\_\_\_.
- 6) A system is in a safe state only if there exists a: \_\_\_\_\_.

**Q.2 Solve any Eight of the following.****16**

- 1) Define Operating systems?
- 2) What is meant by Multiprogramming?
- 3) What is meant by Real time system?
- 4) What is meant by Context Switching?
- 5) Define Mutual Exclusion.
- 6) What is meant by Co-operating process?
- 7) What is meant by Race Condition?
- 8) Define Semaphores?
- 9) What is meant by CPU Scheduler?
- 10) Define demand paging?

**Q.3 A) Attempt any Two of the following.****10**

- 1) List out different types of operating system? Explain Time Sharing and Distributed operating system.
- 2) Explain concept of process with process state.
- 3) Explain FCFS scheduling algorithm with Example.

**B) Short note on****06**

- 1) Swapping
- 2) Boot block

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

- 1) Explain the different Services provided by Operating System.
- 2) Explain the different Scheduling criteria in detail
- 3) Define the term file. Explain different types of file.

**B) Write and Explain different component of operating system.****08****Q.5 Attempt any Two of the following.****16**

- a) Explain Dining Philosopher problem in Process Synchronization.
- b) Explain Bankers Algorithm with example.
- c) What is page replacement? Write the working of FIFO page replacement algorithm.



- 10) Neutrino hypothesis was postulated by \_\_\_\_\_.  
 a) J.J. Thomson                      b) Rutherford  
 c) Pauli                                      d) Fermi

**b) Fill in the blanks. 06**

- 1) Betatron works on the principle of \_\_\_\_\_.
- 2) The disadvantage of relativistic increase of mass is observed in \_\_\_\_\_ type of accelerator.
- 3) Photomultiplier is used in \_\_\_\_\_ counter.
- 4) Leptons are \_\_\_\_\_ type of elementary particles.
- 5) Positron is antiparticle of \_\_\_\_\_.
- 6) The liquid drop model of nucleus was developed by \_\_\_\_\_.

**Q.2 Solve any eight of the following. 16**

- a) Draw neat diagram of scintillation counter.
- b) Define binding energy of nucleus with binding energy curve.
- c) What is accelerator? What is its need?
- d) Define the cross-section of a nuclear reaction? Give its unit.
- e) Define Alpha-disintegration energy.
- f) What is a quark?
- g) Write a note on photons.
- h) Explain stripping reactions.
- i) Explain quenching of discharge in GM Counter.
- j) Explain Beta-decay.

**Q.3 a) Attempt any two of the following. 10**

- 1) Describe Beta-ray spectrometer to determine kinetic energy of Beta-particle.
- 2) What is the Q-value of a nuclear reaction? What are exothermic and Endothermic reactions?
- 3) Explain principle, construction and working of Wilson Cloud Chamber.

**b) Explain the construction and working of GM Counter along with GM plateau region. 06**

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

- 1) Explain the construction and working of Cyclotron. Derive an expression for the maximum energy gained by an ion.
- 2) Explain liquid drop model of nucleus. What are its advantages and disadvantages?
- 3) What is a nuclear reaction? Explain the general scheme of representation of a nuclear reaction. Give one example each of  $(\alpha, p)$ ,  $(p, \alpha)$  and  $(D, p)$  type of nuclear reactions.

**b) Derive the semi-empirical binding energy formula for a nucleus based on the liquid drop model. 08**

**Q.5 Attempt any two of the following. 16**

- a) Explain the principle, construction and working of Scintillation counter.
- b) What are elementary particles? Explain the classification of elementary particles. What are quarks? Explain the types of quarks.
- c) Discuss magnetic alpha-ray spectrometer. Explain fine structure of alpha-line spectra and long-range alpha particle spectrum.







- B) Give the one sentence answer of the following. 06**
- 1) Which year mendelian law rediscover.
  - 2) Give the one name of old world centre of origin.
  - 3) Write the one name of new world centre of origin.
  - 4) Who coin the term mutation in 1900.
  - 5) Write the long form of IPR.
  - 6) Which year first Agriculture University established in India.

- Q.2 Solve any eight of the following. 16**
- a) Define plant breeding.
  - b) What is mean by crop improvement?
  - c) Define the domestication of plant.
  - d) What is natural selection?
  - e) Define the clonal selection
  - f) Give definition of hybridization.
  - g) What is mutation?
  - h) Define polyploidy.
  - i) What is IPR?
  - j) Give the two name of national institute of India.

- Q.3 A) Attempt any two of the following. 10**
- 1) Explain the state agricultural universities of India.
  - 2) Describe the international agricultural institutes studied by you.
  - 3) Write the advantages and disadvantages of IPR.

- B) Write short notes any two of the following 06**
- 1) Forms of IPR
  - 2) Plant Variety Protection Act
  - 3) Role of polyploidy

- Q.4 A) Attempt any two of the following. 08**
- 1) Write the application of mutation in plant breeding.
  - 2) Explain the hybrid vigor studied by you.
  - 3) Describe the synthetic cross.

- B) Attempt any one of the following. 08**
- 1) Explain the multiple cross method studied by you.
  - 2) Describe the hybridization method with their achievements of crops.

- Q.5 Attempt any two of the following. 16**
- a) Write the pure line selection method with their achievements of crops.
  - b) Explain the plant genetic resources studied by you.
  - c) Describe the aims and objective of plant breeding.



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**BOTANY (Special Paper - XII)**  
**Economic Botany (19201505)**

Day & Date: Thursday, 06-07-2023  
 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.  
 4) Use of log table and calculators is allowed.

**Q.1 A) Multiple Choice Questions.****10**

- 1) The leaves of *Sesbania* are \_\_\_\_\_ compound.
  - a) trifoliolate
  - b) paripinnately
  - c) bipinnately
  - d) none of these
- 2) Gram is the common name of \_\_\_\_\_.
  - a) *Medicago sativa*
  - b) *Cajanus cajan*
  - c) *Arachis hypogea*
  - d) *Cicer arietinum*
- 3) Pigeon pea is the common name of \_\_\_\_\_.
  - a) *Medicago sativa*
  - b) *Cajanus cajan*
  - c) *Arachis hypogea*
  - d) *Cicer arietinum*
- 4) *Medicago sativa* is very rich in \_\_\_\_\_.
  - a) proteins
  - b) Vitamins
  - c) minerals
  - d) all of these
- 5) The origin of groundnut is \_\_\_\_\_.
  - a) Brazil
  - b) West Indies
  - c) Peru
  - d) India
- 6) In India \_\_\_\_\_ is the largest producers (80%) of soybean.
  - a) Madhya Pradesh
  - b) Maharashtra
  - c) Gujrat
  - d) Uttar Pradesh
- 7) Coir is obtained from the \_\_\_\_\_ of coconut fruit.
  - a) mesocarp
  - b) epicarp
  - c) endocarp
  - d) none of these
- 8) Ginger produces \_\_\_\_\_ types of roots.
  - a) fibrous
  - b) Fleshy
  - c) taproot
  - d) both a and b
- 9) The source of drug of *Withania* is \_\_\_\_\_.
  - a) root
  - b) Flower
  - c) fruit
  - d) both a and b
- 10) Rubber is obtained by \_\_\_\_\_ process.
  - a) Tapping
  - b) Pulling
  - c) pressing
  - d) Beating

- B) Give the one sentence answer of the following. 06**
- 1) Write one morphological character of legume.
  - 2) Give one use fiber.
  - 3) Give the one example of oil yielding plant.
  - 4) Write one use of Kutch.
  - 5) Give one example of pesticides.
  - 6) Write one use of dyes palas.
- Q.2 Solve any eight of the following. 16**
- a) Write two uses of *Sesbania*.
  - b) Give the two morphological character of Chickpea.
  - c) Write the scientific name of Red gram and Lucerne.
  - d) Explain the two uses of Cotton.
  - e) Give the two morphological character of Coir.
  - f) Write the scientific name of Groundnut and Soyabean.
  - g) Explain the two uses of Rhizome.
  - h) Give the scientific name of clove and Ginger.
  - i) Define Rubber.
  - j) Write source of Oak and Teak.
- Q.3 A) Attempt any two of the following. 10**
- 1) Explain the morphology, source and economic importance of Chickpea.
  - 2) Give the morphology, source and economic importance of Lucerne.
  - 3) Describe the morphology, source and economic importance of Cotton.
- B) Solve any two of the following. 06**
- 1) Explain the botanical name and morphology of Groundnut.
  - 2) Write scientific name and uses of Gulvel.
  - 3) Describe the source and economic importance of Neem.
- Q.4 A) Attempt any two of the following. 08**
- 1) Explain the morphology and uses of Adulsa.
  - 2) Give the morphology and uses of *Withania somnifera*.
  - 3) Describe the properties of Rubber.
- B) Attempt any one of the following. 08**
- 1) Describe the scientific name, source, morphology, chemical constituent and uses of clove.
  - 2) Explain the botanical name, source, morphology and economic importance of Red gram.
- Q.5 Attempt any two of the following. 16**
- a) Give the botanical name, source, morphology, extraction method and uses of Rubber.
  - b) Explain the botanical name, source, morphology and importance of Tobacco.
  - c) Describe the botanical name, source and economic importance of Manjista and Turmeric.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Special Paper - XII)**  
**Wildlife Conservation & Management (19201523)**

Day & Date: Thursday, 06-07-2023  
 Time: 03:00 PM To 6:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple Choice Questions.**

**10**

- 1) The scientific name of Great Indian Bustard is \_\_\_\_\_.  
 a) *Ardeotis arabs*                      b) *Ardeotis australis*  
 c) *Ardeotis nigriceps*                  d) *Ardeotis indica*
- 2) \_\_\_\_\_ is an *in-situ* method used to preserve genetic diversity for long-term conservation.  
 a) Maintaining breeds and varieties in natural habitat  
 b) Gene Banks  
 c) Seed Banks  
 d) Cryopreservation of germ plasm
- 3) \_\_\_\_\_ management practice is routinely used to reduce forest fires and restore ecosystem functions.  
 a) Monoculture plantation              b) Horticulture plantation  
 c) Logging                                  d) Overgrazing
- 4) \_\_\_\_\_ method is good for the estimation of population of rabbits and deers.  
 a) Pugmarks                                  b) Vocalization frequency  
 c) Trap                                        d) Fecal pellet group count
- 5) \_\_\_\_\_ is used to track migrating wild animals, their physiology, energetic and orientation.  
 a) Biosensor                                b) Biotelemetry  
 c) Bio-geo-informatics                  d) Bioinformatics
- 6) \_\_\_\_\_ national park was the first one in India.  
 a) Kaziranga                                b) Jim Corbet  
 c) Manas                                      d) Great Himalayan
- 7) \_\_\_\_\_ state has initiated the 'conservation breeding' program for Great Indian Bustards.  
 a) Maharashtra                            b) Gujrat  
 c) Karnataka                                d) Rajasthan
- 8) \_\_\_\_\_ country is home to 70% of wild tigers in the world.  
 a) China                                      b) India  
 c) Russia                                      d) America
- 9) In \_\_\_\_\_ year 'Project Tiger' was launched in India.  
 a) 1999                                        b) 1973  
 c) 1983                                        d) 1993



**Q.5 Attempt any two of the following.**

- a) Give a detailed account on national parks, sanctuaries and community reserves in India with their features.
- b) Discuss various physical and biological parameters used in the evaluation and management of wildlife habitat.
- c) Explain positive and negative values of wildlife and add a note of causes of depletion of wildlife.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Special Paper XII)**  
**Partial Differential Equations (19201527-A)**

Day & Date: Thursday, 06-07-2023  
 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) Select the correct alternative for each of the following. 10**

- 1) In a first order partial differential equation  $f(x, y, z, p, q) = 0$  is linear in  $p$  and  $q$  then the equation is known as \_\_\_\_\_.
  - a) Linear equation
  - b) Semi Linear equation
  - c) Quasi-Linear equation
  - d) Non Linear equation
- 2) The equation  $\frac{\partial^2 z}{\partial x^2} - 2 \left( \frac{\partial^2 z}{\partial x \partial y} \right) + \left( \frac{\partial z}{\partial y} \right)^2 = 0$  is of order \_\_\_\_\_.
  - a) 1
  - b) 2
  - c) 3
  - d) 4
- 3) When the number of arbitrary constant less than the number of independent variables then by eliminating arbitrary constant we get \_\_\_\_\_.
  - a) more than one p.d.e. of order one
  - b) unique p.d.e. of order one
  - c) p.d.e. of order greater than one
  - d) unique p.d.e. of order greater one
- 4) The general solution of  $p \tan x + q \tan y = \tan z$  is \_\_\_\_\_.
  - a)  $\phi \left( \frac{\sin x}{\sin y}, \frac{\sin y}{\sin z} \right) = 0$
  - b)  $\phi \left( \frac{\sin y}{\sin x}, \frac{\sin y}{\sin z} \right) = 0$
  - c)  $\phi \left( \frac{\cos x}{\cos y}, \frac{\cos y}{\cos z} \right) = 0$
  - d)  $\phi \left( \frac{\cos y}{\cos x}, \frac{\cos y}{\cos z} \right) = 0$
- 5) The integral which does not contains an arbitrary constant is called \_\_\_\_\_.
  - a) Complete integral
  - b) Singular integral
  - c) General integral
  - d) Particular integral
- 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 standard form IV of non linear p.d.e. of order 1 is \_\_\_\_\_.
  - a)  $f_1(x, p) = f_2(y, q)$
  - b)  $f_1(y, p) = f_2(x, q)$
  - c)  $f_1(x, y) = f_2(p, q)$
  - d) All of these
- 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)  $\int f(y, c + mx) dx$

- 9) The P.I. of  $(D^2 - 2DD' + D'^2)z = e^{x+2y} + x^3$  is \_\_\_\_\_
- a)  $e^{x+2y} + x^2/20$                       b)  $e^{x+2y} + x^3/20$   
 c)  $e^{x+2y} + x^4/20$                       d)  $e^{x+2y} + x^5/20$
- 10) The C.F. of  $(D^2 - D^1)z = xe^{x+y}$  is \_\_\_\_\_
- a)  $\sum Ae^{hx+h^2y}$                       b)  $\sum Ae^{-hx+h^2y}$   
 c)  $\sum Ae^{hx-h^2y}$                       d)  $\sum Ae^{-hx-h^2y}$

**B) Fill in the blanks**

**06**

- 1) The first order Partial differential equation  $p = P(x, y), q = Q(x, y)$  are compatible if and only if \_\_\_\_\_.
- 2) The Lagrange's auxiliary equation of partial differential equation  $Pp + Qq = R$  are \_\_\_\_\_.
- 3) The singular integral of  $z = px + qy + \log(pq)$  is \_\_\_\_\_.
- 4) The complete integral  $\sqrt{p} + \sqrt{q} = 1$  is \_\_\_\_\_.
- 5) The general solution of  $(D^2 + D'^2)z = 30(2x + y)$  is \_\_\_\_\_.
- 6) The Auxiliary equation of  $r - 2s + t = \sin(2x + 3y)$  is \_\_\_\_\_.

**Q.2 Solve any eight of the following:**

**16**

- a) Form a partial differential equation by eliminating  $h$  and  $k$  from the equation  $(x - k)^2 + (y - h)^2 + z^2 = \lambda^2$
- b) If  $z = f(x + ay) + \phi(x - ay)$  then prove that  $\frac{\partial^2 z}{\partial y^2} = a^2 \frac{\partial^2 z}{\partial x^2}$
- c) Solve  $x^2p + y^2q = z^2$
- d) Define singular integral.
- e) Define complete integral.
- f) Solve  $z = px + qy + 2\sqrt{pq}$
- g) Find the complete integral of  $p^2 = zq$
- h) Solve  $(D^2 - a^2 D'^2)z = 0$
- i) Solve  $(D^4 + D'^2 + 2D^2D'^2)z = 0$
- j) Solve  $(D^2 - D'^2 + D - D^1)z = 0$

**Q.3 A) Attempt any two of the following:**

**10**

- 1) Solve  $(mz - ny)p + (nx - \ell z)q = (\ell y - mx)$
- 2) Solve  $3p^2 - 2q^2 = 4pq$
- 3) Solve  $(D^2 - 2DD^1 + D'^2)z = e^{x+2y}$

**B) Find the integral surface of the linear PDE**

**06**

$$x(y^2 + 2)p - y(x^2 + z)q = (x^2 - y^2)z$$

**Q.4 A) Attempt any two of the following:**

**08**

- 1) Solve  $(x^2 + y^2)p + 2xyq = z(x + y)$
- 2) Solve  $p^3 + q^3 = 3pqz$
- 3) Solve  $(D^2 - 2DD' + D'^2)z = 12xy$

**B) Explain Charpit's method for solving the partial differential equation**

**08**

$f(x, y, z, p, q) = 0$  where  $x$  and  $y$  are independent variables and

$$p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}$$

**Q.5 Attempt any two of the following.**

- a) Explain Lagrange's method of solving  $Pp + Qq = R$  when  $P, Q, R$  are function  $x, y, z$ .
- b) Solve by using Charpit's method  $px + qy + pq = 0$
- c) If  $F(DD')$  is homogeneous function of  $D$  and  $D'$  of degree  $n$  and  $F(a, b) = 0$  ie  $(bD - aD')$  is factor of  $F(DD')$  then, show that  $\frac{1}{(bD - aD')} \phi(ax + by) = \frac{x^n}{b^n n!} \phi(ax + by)$



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**Mathematics (Special Paper XII)**  
**Mathematical Analysis (19201527-B)**

Day &amp; Date: Thursday, 06-07-2023

Max. Marks: 80

Time: 03:00 PM To 06:00 PM

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

**Q.1 A) Select the correct alternative for each of the following. 10**

- 1) A function  $f$  is said to tend to a limit  $l$  as  $x$  tends to  $c$  from the right if for each  $\epsilon > 0$ , there exist  $\delta > 0$  such that \_\_\_\_\_.
- a)  $|f(x) - l| < \epsilon$  when  $c < x < c + \delta$   
 b)  $|f(x) - l| < \epsilon$  when  $c - \delta < x < c$   
 c)  $|f(x) - l| < \epsilon$  when  $c - \delta < x < c + \delta$   
 d)  $|f(x) - l| < \epsilon$  when  $c < x < c + \delta$
- 2) If  $f(x) = 2^{\frac{1}{x-1}}$  then which of the following is correct?
- a)  $\lim_{x \rightarrow 1^-} f(x)$  and  $\lim_{x \rightarrow 1^+} f(x)$  exist but they are not equal  
 b)  $\lim_{x \rightarrow 1^-} f(x) = \lim_{x \rightarrow 1^+} f(x) = 0$   
 c)  $\lim_{x \rightarrow 1} f(x)$  exists  
 d)  $\lim_{x \rightarrow 1} f(x)$  does not exist
- 3) Which of the following is not uniformity continuous on the indicated Interval?
- a)  $f(x) = x^2$  on  $[-1, 1]$                       b)  $f(x) = \tan^{-1} x$  on  $\mathbb{R}$   
 c)  $f(x) = x^3$  on  $[0, \infty)$                       d) All of these
- 4) Consider the following statement for  $f(x) = e^{|x|}$
- I) The function  $f$  is continuous at  $x = 0$   
 II) The function  $f$  is differentiable at  $x = 0$
- a) Only I) is true                                      b) Only II) is true  
 c) Both I) and II) are true                      d) Both I) and II) are false
- 5) How many points  $c$  are there in the interval  $[-2, 2]$  which satisfies Rolle's theorem for the function  $f(x) = x^3 - 4x$ ?
- a) Zero    b) One  
 c) Two    d) Three
- 6) By Lagrange's MVT the value of  $c =$  \_\_\_\_\_ if  $f(x) = x(x-1)(x-2)$  on  $\left[0, \frac{1}{2}\right]$
- a) 6    b)  $6 - \sqrt{21}$   
 c)  $\frac{(6 - \sqrt{21})}{21}$     d)  $\frac{6 - \sqrt{21}}{6}$



- h) Define total variation of a function  $f$  on interval  $[a, b]$ .
- i) Show that the function  $f(x) = x^2 \sin\left(\frac{1}{x}\right)$ , if  $x \neq 0$  and  $f(0) = 0$  is of bounded variation on  $[0,1]$ .
- j) Prove that  $E(x_1 + x_2) = E(x_1).E(x_2)$

**Q.3 A) Attempt any two of the following. 10**

- 1) Define Dirichlet's function on  $\mathbb{R}$  and show that it is discontinuous at every point.
- 2) State and prove Lagrange's mean value theorem.
- 3) Show that the function  $f(x) = \begin{cases} x \sin \frac{\pi}{x} & \text{when } 0 < x < 1 \\ 0 & \text{when } x = 0 \end{cases}$  is not a function of bounded variation.

**B) State and prove Jordan's theorem. 06**

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

- 1) Show that a function which is uniformly continuous on interval is continuous on that interval.
- 2) If  $f$  is derivable at  $c$  and  $f(c) \neq 0$  then prove that  $\frac{1}{f}$  is also derivable at  $c$  and  $\left(\frac{1}{f}\right)'(c) = \frac{-f'(c)}{[f(c)]^2}$
- 3) Show that a function of bounded variation is necessarily bounded.

**B) State and prove Taylor's theorem. 08**

**Q.5 Attempt any two of the following. 16**

a) A function  $f$  is defined on  $\mathbb{R}$  by

$$f(x) = \begin{cases} -x^2 & \text{if } x \leq 0 \\ 5x - 4 & \text{if } 0 < x \leq 1 \\ 4x^2 - 3x & \text{if } 1 < x \leq 2 \\ 3x + 4 & \text{if } x > 2 \end{cases}$$

Examine the continuity of  $f$  at  $x = 0, 1, 2$ . Also discuss the kind of discontinuity if any.

- b) Show that  $\frac{\tan x}{x} > \frac{x}{\sin x}$ , for  $0 < x < \frac{\pi}{2}$
- c) Prove that the variation function of a function  $f$  of bounded variation is continuous if and only if  $f$  is continuous function.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023  
STATISTICS (Special Paper – XII)  
Operations Research (19201531)**

Day & Date: Thursday, 06-07-2023  
Time: 03:00 PM To 6:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple Choice questions.**

**10**

- 1) Constraints in an LP model represents \_\_\_\_\_.
  - a) limitations
  - b) requirements
  - c) balancing limitations and requirements
  - d) all of the above
- 2) Graphical method is applicable for solving LPP which has only \_\_\_\_\_.
  - a) 5 Variables
  - b) 3 variables
  - c) 4 variables
  - d) 2 variables
- 3) While plotting constraints on a graph paper, terminal points on both the axes are connected by a straight line because \_\_\_\_\_.
  - a) The resources are limited in supply
  - b) The objective function is a linear function
  - c) The constraints are linear equations or inequalities
  - d) All of the above
- 4) Every basic feasible solution of a general assignment problem, having a square pay-off matrix of order, n should have assignments equal to \_\_\_\_\_.
  - a)  $2n + 1$
  - b)  $2n - 1$
  - c)  $m + n - 1$
  - d)  $m + n$
- 5) Which of the following method is method of obtaining initial basic feasible solution to transportation Problem?
  - a) Hungarian
  - b) North- West
  - c) Simplex
  - d) Newton Raphson
- 6) The minimum expected opportunity loss (EOL) is \_\_\_\_\_.
  - a) Equal to EVPI
  - b) Minimum regret
  - c) Equal to EMV
  - d) both a) and b)
- 7) A decision alternative in decision making problem is known as \_\_\_\_\_.
  - a) Strategy
  - b) States of Nature
  - c) Payoff
  - d) None of these
- 8) Monte Carlo is \_\_\_\_\_.
  - a) a technique for modeling
  - b) a book
  - c) a technique for Simulation
  - d) None of these



**Q.5 Attempt any Two of the following.**

- a) Find the Initial Basic Feasible Solution to the following Transportation problem by using Matrix Minima method,

		Destination				Supply
		D1	D2	D3	D4	
Source	S <sub>1</sub>	6	5	8	5	30
	S <sub>2</sub>	5	11	9	7	40
	S <sub>3</sub>	8	9	7	13	50
Demand		35	28	32	25	

- b) Suggest the best strategy using the EMV criteria for the following decision-making problem:

States of Nature	Acts			P(E <sub>i</sub> )
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	
E <sub>1</sub>	25	-10	-125	0.4
E <sub>2</sub>	400	440	400	0.2
E <sub>3</sub>	650	740	750	0.4

- c) Find the optimal sequence in performing the following five jobs on two machines. Processing times (in hours) are given in the following table:

Job	1	2	3	4	5
Machine M1	30	120	50	20	90
Machine M2	80	100	90	60	30

Also find total elapsed time and idle times for both machines.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**STATISTICS (Special Paper - XII)**  
**Regression Analysis (19201532)**

Day & Date: Thursday, 06-07-2023  
 Time: 03:00 PM To 6:00 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 alternative.****10**

- 1) In simple linear regression model  $Y = \beta_0 + \beta_1 X + \varepsilon$ ,  $\beta_0$  and  $\beta_1$  are respectively \_\_\_\_\_.
  - a) slope and intercept
  - b) intercept and slope
  - c) error and slope
  - d) intercept and error
- 2) The difference between the observed value  $Y_i$  and corresponding fitted value  $\hat{Y}_i$  is called \_\_\_\_\_.
  - a) intercept
  - b) error
  - c) residual
  - d) none of these
- 3) In a simple linear model  $Y = \beta_0 + \beta_1 X + \varepsilon$ , the change in  $Y$  for one unit increase in  $X$  \_\_\_\_\_.
  - a) will always be the same amount  $\beta_0$
  - b) will always be the same amount  $\beta_1$
  - c) will depend on error term
  - d) will depend on level of  $X$
- 4) If coefficient of determination is equal to 1, then the correlation coefficient \_\_\_\_\_.
  - a) must also equal to 1
  - b) can be either -1 or +1
  - c) can be any value between -1 and +1
  - d) must be - 1
- 5) A linear regression model is called 'linear' in the sense that it is a linear function of the \_\_\_\_\_.
  - a) response
  - b) regressors
  - c) parameters
  - d) predictors
- 6) Forward selection procedure starts with the \_\_\_\_\_ predictor variables in the model.
  - a) without
  - b) some
  - c) All
  - d) none of these
- 7) To test significance of an individual regression coefficient in multiple linear regression model \_\_\_\_\_ is used.
  - a)  $F$  test
  - b)  $t$  test
  - c)  $Z$  test
  - d)  $\chi^2$  test

- 8) If the coefficient of determination ( $R^2$ ) is near to one, then it leads to the conclusion that \_\_\_\_\_.  
 a) a good linear relation exists  
 b) there is a lack of linear relationship  
 c) there is curvilinear relation  
 d) none of these
- 9) 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.
- 10) In logistic regression 'logit' transformation is defined as \_\_\_\_\_.  
 a)  $\ln\left(\frac{\pi(x)}{1 - \pi(x)}\right)$                       b)  $\ln(1 - \pi(x))$   
 c)  $\ln(\pi(x))$                                       d)  $\ln\left(\frac{1 - \pi(x)}{\pi(x)}\right)$

**B) Fill in the blanks.**

**06**

- 1) In a simple linear regression model, the distribution of response variable is \_\_\_\_\_.
- 2) In the regression equation,  $Y = 75.65 + 0.50X + \varepsilon$ , the intercept is \_\_\_\_\_.
- 3) In a logistic regression model with single covariate, the odd ratio  $\psi$  is related to the regression coefficient  $\beta_1$  by \_\_\_\_\_.
- 4) Deviance statistic can be shown to follow \_\_\_\_\_.
- 5) To test significance of an individual regression coefficient in multiple linear regression model \_\_\_\_\_ is used.
- 6) If  $e_i$  is the  $i^{th}$  ordinary residual then  $E(e_i)$  is \_\_\_\_\_.

**Q.2 Solve any Eight of the following.**

**16**

- a) Define studentized residuals and mention its use.
- b) In a multiple linear regression model, show that the hat matrix is symmetric.
- c) Explain the multiple linear regression model with illustration.
- d) With usual notations, show that  $Var(\hat{Y}) = H\sigma^2$ .
- e) Define Coefficient of determination  $R^2$ .
- f) Explain the concept of simple logistic regression model.
- g) State assumptions of error vector in multiple regression model.
- h) Obtain the confidence interval for  $\beta_0$  in simple linear regression model.
- i) Describe Pearson's residual in the context of logistic regression.
- j) Discuss the logit transformation in the context of logistic regression model.

**Q.3 A) Attempt any Two of the following.**

**10**

- 1) Describe backward elimination methods of variable selection in linear regression.
- 2) In a simple linear regression model describe the test procedure for testing  $H_0: \beta_1 = 0$  against  $H_1: \beta_1 \neq 0$ .
- 3) Obtain MLE of the regression parameters of the logistic regression model with single covariate.

**B) Define residual and derive the relation between residual and error.**

**06**



- Q.4 A) Attempt any Two of the following. 08**
- 1) Define standardized and studentized residuals. Briefly mention their uses.
  - 2) What is logistic regression model? Give two situations where such model is appropriate.
  - 3) In a multiple linear regression model, obtain the variance-covariance matrix of residuals.
- B) For a multiple linear regression model define residual and residual sum of squares (RSS). Show that  $RSS = Y'(I - H)Y$ . 08**
- Q.5 Attempt any Two of the following. 16**
- a) Obtain the confidence intervals for the regression coefficients  $\beta_0$  and  $\beta_1$  in the context of simple linear regression model.
  - b) Describe a multiple linear regression model. Find the least squares estimators of regression coefficients.
  - c) Derive the likelihood ratio test with reference to single covariate logistic regression model.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023  
GEOLOGY (Special Paper - XII)**

**Applied Geology - Prospecting and Mining Geology (19201537)**

Day & Date: Thursday, 06-07-2023  
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.  
4) Use of log table and calculators is allowed.

**Q.1 A) Multiple choice questions.**

**10**

- 1) Which of the following geological criteria is used for Kimberlites?
  - a) Magma gene criteria
  - b) Climatic criteria
  - c) Structural criteria
  - d) All of the above
- 2) The \_\_\_\_\_ criteria are associated with the chemical composition and behaviour of elements in the earth's crust.
  - a) Geological
  - b) Geophysical
  - c) Geochemical
  - d) None of the above
- 3) In resistivity survey, \_\_\_\_\_ method of exploration is termed as constant depth traversing.
  - a) Profiling
  - b) Depth sounding
  - c) VES
  - d) None of the above
- 4) \_\_\_\_\_ elements/minerals provide good clues in the search for hidden ore bodies because they generally form large haloes.
  - a) Primary
  - b) Pathfinder
  - c) Indicator
  - d) None of the above
- 5) When minerals are located too deep in the ground, the method used for mining is \_\_\_\_\_.
  - a) open pit mining
  - b) quarries
  - c) surface mining
  - d) sub-surface mining
- 6) In the seismic refraction method, the waves sent along the ground surface is picked by \_\_\_\_\_.
  - a) Geo satellite instrument
  - b) Geophone
  - c) Wave detector
  - d) All of the mentioned
- 7) Which of the following is Environmental Impacts of Mining?
  - a) pollute air and drinking water
  - b) harm wildlife and habitat
  - c) permanently scar natural landscapes
  - d) All of the above
- 8) Bouger anomaly correction is carried out to detect \_\_\_\_\_ survey.
  - a) Seismic
  - b) Magnetic
  - c) Electrical
  - d) Gravity



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Special Paper - XII)**  
**Industrial Microbiology (19201542)**

Day & Date: Thursday, 06-07-2023  
 Time: 03:00 PM To 6:00 PM

Max. Marks: 80

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

**Q.1 A) Rewrite the following sentences by selecting correct answers from given alternatives. 10**

- 1) \_\_\_\_\_ causes food poisoning.
  - a) Salmonella
  - b) Proteus
  - c) Vibrio
  - d) Clostridium
- 2) By crushing of grapes juice ready for fermentation is called \_\_\_\_\_.
  - a) Scud
  - b) Broth
  - c) Must
  - d) Fluid
- 3) Distillation is used for recovery of \_\_\_\_\_.
  - a) Ethanol
  - b) Amylase
  - c) Penicillin
  - d) Vitamin B12
- 4) Insulin producing gene for rDNA technology is obtained from \_\_\_\_\_.
  - a) E. coli
  - b) Beta cells of pancreas
  - c) Liver cells
  - d) Yeast cells
- 5) Malt used for Beer fermentation is prepared from \_\_\_\_\_.
  - a) Molasses
  - b) Ground nut
  - c) Pea nut
  - d) Barley
- 6) \_\_\_\_\_ is also known as Cobalamin.
  - a) L-Lysine
  - b) Streptomycin
  - c) Vitamin B12
  - d) Insulin
- 7) \_\_\_\_\_ are preserved by osmotic pressure.
  - a) Meat
  - b) Pickles
  - c) Sugar
  - d) Grains
- 8) Preliminary or Sham test is used for \_\_\_\_\_ testing of product.
  - a) Toxicity
  - b) Carcinogenicity
  - c) Allergy
  - d) Pyrogenicity
- 9) Streptomycin fermentation occurs in \_\_\_\_\_ phases.
  - a) 2
  - b) 3
  - c) 4
  - d) 5
- 10) *Serratia marcescens* causes \_\_\_\_\_ coloured surface pigmentation in meat.
  - a) Red
  - b) White
  - c) Green
  - d) Black

- B) Fill in the blanks.** **06**
- 1) The aW value for pure water is \_\_\_\_\_.
  - 2) \_\_\_\_\_ medium is used for production of Streptomycin.
  - 3) Bruce Ames test is used for \_\_\_\_\_ testing.
  - 4) Cheddar cheese is an example of \_\_\_\_\_ cheese.
  - 5) Insulin is used for treating \_\_\_\_\_.
  - 6) \_\_\_\_\_ is also called cold sterilization.
- Q.2 Solve any eight of the following.** **16**
- a) Which organism is used for Vitamin B12 production?
  - b) Give the two examples of chemical food preservative.
  - c) What is Food infection?
  - d) Give the types of Beers.
  - e) Give the use of Streptomycin.
  - f) On which animal allergy testing is done?
  - g) Define Desert wines.
  - h) Which organism is responsible for ropiness in milk?
  - i) Give two principles of food preservation.
  - j) Which method is used for recovery of Ethanol?
- Q.3 A) Attempt any two of the following.** **10**
- 1) Spoilage of meat and poultry
  - 2) Pyrogenicity testing
  - 3) Recovery by solvent extraction
- B) Give in detail beer production.** **06**
- Q.4 A) Attempt any two of the following.** **08**
- 1) Describe in detail Idli production.
  - 2) Describe in Brief Toxicity testing.
  - 3) Explain the L-Lysine fermentation.
- B) Describe in detail Food borne diseases.** **08**
- Q.5 Attempt any two of the following.** **16**
- a) Discuss in detail Wine production.
  - b) Describe in detail Streptomycin fermentation.
  - c) Describe in detail manufacture of Cheese.

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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS (Special Paper - XII)**  
**Electronics Communication (19201552)**

Day & Date: Thursday, 06-07-2023  
 Time: 03:00 PM To 6:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple choice questions.**

**10**

- 1) Two Way communication is called as a \_\_\_\_\_.  
 a) Simplex Communication    b) Duplex Communication  
 c) Multiplex Communication    d) None of these
- 2) The three main elements of communication system are \_\_\_\_\_.  
 a) Transmitter, Receiver, Signal  
 b) Transmitter, Receiver, Channel  
 c) Signal, Receiver, Noise  
 d) Transmitter, Signal, Noise
- 3) Frequency of LSB in AM is \_\_\_\_\_.  
 a)  $W_m + W_c$     b)  $W_m - W_c$   
 c)  $W_c - W_m$     d) None of these
- 4) Number of frequency spectrum in AM wave are \_\_\_\_\_.  
 a) Two    b) Four  
 c) Infinite    d) None of these
- 5) If in AM signal  $m_a=1$  and amplitude of carrier signal 10 volt then amplitude transmitted by side band signal is \_\_\_\_\_.  
 a) 10 V    b) 5 V  
 c) 20 V    d) None of these
- 6) Which is not internal unit telephone hand set \_\_\_\_\_.  
 a) Ringer    b) Local Loop  
 c) Hybrid    d) Transmitter and Receiver
- 7) Detection is used in \_\_\_\_\_.  
 a) Transmitter    b) Receiver  
 c) Both a and b    d) None of these
- 8) A long form of DTMF.  
 a) Digital timer multiple frequency  
 b) Dial-tone multi frequency  
 c) Digital tone multiple frequency  
 d) All of the above
- 9) Number of tones in telephone are \_\_\_\_\_.  
 a) 1    b) 2  
 c) 3    d) 0



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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Special Paper – XII)**  
**Python (19201546)**

Day & Date: Thursday, 06-07-2023  
 Time: 03:00 PM To 6:00 PM

Max. Marks: 80

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

**Q.1 A) Multiple choice questions. 10**

- 1) PVM is often called \_\_\_\_\_.
  - a) Python compiler
  - b) Python volatile machine
  - c) Python interpreter
  - d) Portable virtual machine
  
- 2) Which of the following blocks allows you to test the code blocks for errors?
  - a) except block
  - b) try block
  - c) finally block
  - d) None of these
  
- 3) Study the following program:  
 Class Student:  
     Print("Students of Section A")  
 Student()  
 Student()  
 obj = Subject()  
 how many objects are there for the given program?
  - a) 4
  - b) 3
  - c) 2
  - d) 1
  
- 4) Which of the following statements would create a tuple in python?
  - a) mytuple[123] = ("apple", "banana", "cherry")
  - b) mytuple = ("2" \* ("apple", "banana", "cherry"))
  - c) mytuple = ("apple", "banana", "cherry")
  - d) None of the these
  
- 5) Study the following statements:  
 >>> str1= "POONAM"  
 >>> str2 = "."  
 >>> str3 = "YASHASHREE"  
 >>> str1[-1:]  
 What will be the output of this statement?
  - a) m
  - b) M
  - c) POONAM
  - d) YASHASHREE
  
- 6) What is the output when following code is executed?  
 >>> names = ['Meera', 'Radha', 'Saraswati', 'Laxmi']  
 >>> print(names[-3][-3])
  - a) d
  - b) Daman
  - c) Error
  - d) h



- 7) In Regex, s stands for?
- Returns a match where the string DOES NOT contain digits
  - Returns a match where the string DOES NOT contain a white space character
  - Returns a match where the string contains a white space character
  - Returns a match if the specified character are at the end of the string.
- 8) \_\_\_\_\_ function returns a randomly selected element from a non-empty sequence.
- random.random()
  - random.randint()
  - random.choice()
  - random()
- 9) The python \_\_\_\_\_ takes source code as input and returns a code object which can later be executed by exec() function.
- callable() Function
  - bytes() Function
  - compile() function
  - exec() Function
- 10) What will be the output of below python code?  
Employee = {"Name": "Prem", "Age": 23,  
"salary":50000, "Company": "GOOGLE", "Address": "Bangalore"}  
for x in Employee:  
print(x)
- Name Age salary company address
  - Prem 23 50000 GOOGLE Bangalore
  - Prem 23 50000 GOOGLE
  - Name Age salary company

**B) Fill in the blanks.**

06

- Python Keywords are special reserved words that convey a special meaning to the \_\_\_\_\_.
- The Python \_\_\_\_\_ allows a part of the code to be executed until the given condition returns false.
- A \_\_\_\_\_ can be written as the collection of comma-separated (,) values enclosed with the small () brackets.
- The python \_\_\_\_\_ function is used to return the binary representation of a specified integer.
- The Python \_\_\_\_\_ is defined as a container that is used to store collections of data, for example - list, dict, set, and tuple etc.
- The \_\_\_\_\_ can be defined as the sequence of characters which are used to search for a pattern in a string.

**Q.2 Solve any Eight of the following.**

16

- Define String literals.
- Define Pass statement.
- Characteristics of Lists.
- What is set?
- Explain abs() Function with example.
- How to get the current time?
- Explain the import statement.
- Explain any four Common Exceptions.
- Explain Python Multi-Level inheritance.
- Explain Python pow() Function with example.

- Q.3 A) Attempt any Two of the following. 10**
- 1) Explain local and global variable in python with example.
  - 2) What is loop? Explain different types of loops used in python.
  - 3) Explain math module with example.
- B) Short note/Solve 06**
- 1) What is inheritance? Explain all types of inheritance.
  - 2) What is difference between tuple and list?
- Q.4 A) Attempt any Two of the following. 08**
- 1) What is exception? Explain various keywords to handle exception.
  - 2) Explain any five methods of Dictionary with suitable example.
  - 3) Explain the characteristic of python.
- B) Explain following File Handling operations & Access mode in python with example. 08**
- 1) Open a file
  - 2) Read or write – Performing operation
  - 3) Close the file
  - 4) File Access mode
- Q.5 Attempt any Two of the following. 16**
- a) How to reverse a number in Python. Write a program algorithm with example.
  - b) What is module? What are the advantages of module? Write a program for importing multiple modules.
  - c) Define Regular Expressions. Explain Regex Functions with example.



- 10) A fluorescent tube converts electric energy into \_\_\_\_\_ energy.  
 a) rotary mechanical                      b) solar  
 c) light    d) heat

**Q.1 B) Fill in the blanks/ Definition/ One sentence answer/ One-word answer/ 06**  
**Give the name/ predict the product etc.**

- 1) Mention any two electrical quantities which has same unit?
- 2) An automatic iron converts electric energy into \_\_\_\_\_ energy.
- 3) The value of a resistance is determined using \_\_\_\_\_ code.
- 4) In an electric doorbell hammer strikes on \_\_\_\_\_.
- 5) Which one of these viz,
  - i) Generator
  - ii) Main compressor
  - iii) Cooling fan and
  - iv) Heat exchanger, is not a component of a simple air- cooling system?
- 6) Which gas among Hydrogen (H<sub>2</sub>), Carbon dioxide (CO<sub>2</sub>), Argon (Ar) and Methane (CH<sub>4</sub>) is sometimes used in filament lamps?

**Q.2 Solve any Eight of the following. 16**

- a) Maximum value of a. c. cycle is 50 V, then calculate Average value the voltage.
- b) Maximum value of a. c. cycle is 200 V, then calculate R.M.S. value the voltage.
- c) Two resistances of 100 Ω resistance each are connected in parallel. Calculate their resultant resistance.
- d) How resistances of a resistor is calculate using colour code?
- e) What is a magnet?
- f) Differentiate between a magnet and electromagnet.
- g) Discuss points of difference between a ceiling fan and table fan.
- h) How a tungsten filament works?
- i) Mention different part is of tungsten lamp.
- j) What is an inductor?

**Q.3 A) Attempt any Two of the following. 10**

- 1) Discuss different safety rules of electricity.
- 2) With neat diagram explain working of ceiling fans.
- 3) Draws neat diagram of tube light and its circuit.

**B) Discuss different parts of mixer. 06**

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

- 1) Discuss the detail different types of connecting wires and their capacity.
- 2) With neat diagram explain working f table fans.
- 3) Discuss different parts of air cooler.

**B) With neat diagram explain working of electric iron. 08**

**Q.5 Attempt any two of the following. 16**

- a) What is need of Earthing?
- b) Draw diagram of geyser and explain its working.
- c) Draw neat diagrams of hair dryer and explain its principle of working.



- B) Attempt all the following. 06**
- 1) What does 'E' stand for in SEM?
  - 2) Write the range of thin film.
  - 3) What is the full form XRD?
  - 4) Compute the resistivity of give material whose resistance is  $2.5\Omega$ ; area of cross-section and length are 25 and 10 cm respectively.
  - 5) Water loving material surface means \_\_\_\_\_.
  - 6) Mention the materials used in substrate cleaning process.

- Q.2 Attempt any EIGHT of the following. 16**
- a) Mentions the applications of thin film.
  - b) Write down the names four physical methods.
  - c) State the advantages of chemical methods over physical methods.
  - d) What do you mean by optical band gap?
  - e) Sketch the labelled diagrams that showing superhydrophilicity and super hydrophobicity.
  - f) State the Beer-Lambert's law for absorption spectroscopy.
  - g) Write down the applications of XRD.
  - h) Mention any four examples of conductive substrates.
  - i) What are general deposition parameters for chemical deposition method?
  - j) There is a family of planes 0.252 nm of spacing in a NaCl crystal. If the 1<sup>st</sup> order maximum is observed at an incident angle of  $18.1^\circ$  then what is wavelength of the X-ray scattering from the NaCl crystal?

- Q.3 A) Attempt any Two of the following. 10**
- 1) Write a short note on top-down and bottom-up approach for thin film deposition.
  - 2) Explain cyclic process involved in SILAR method with labelled diagram.
  - 3) Explain important factors for material selection process.
- B) Explain demerits of chemical deposition method over physical deposition method. 06**

- Q.4 A) Attempt any two of the following. 08**
- 1) Explain substrate cleaning process of thin film deposition method.
  - 2) Draw a block diagram Uv-V is spectrophotometer; state its principal, advantages.
  - 3) If saltwater contains 40gm of sodium chloride per 500 ml, then find the molarity of a solution if molar mass is  $58.443 \text{ g mol}^{-1}$ .
- B) Draw the labelled diagram of SEM and explain. 08**

- Q.5 Attempt any two of the following. 16**
- a) Describe sol-gel method in detail.
  - b) Draw the neat labelled diagram of spray pyrolysis deposition method and explain the function each part of the instrumentations.
  - c) Explain an experimental procedure for finding the XRD patterns. What information does the XRD pattern of a crystal provide?



**B) Fill in the blank/ Definition/One sentence answer/One word answer/Give the name/Predict the product etc.** **06**

- 1) The \_\_\_\_\_ file can be imported for data into Origin software.
- 2) Good Research is always \_\_\_\_\_.
- 3) JRF stands for \_\_\_\_\_.
- 4) The intersection of a column and a row in MS Excel worksheet is known as \_\_\_\_\_.
- 5) The Origin software is specifically a \_\_\_\_\_ software.
- 6) \_\_\_\_\_ can be used as a keyboard shortcut key to check spelling in MS Excel.

**Q.2 Solve any Eight of the following.** **16**

- a) What is research?
- b) Name any four types of reports.
- c) What is referencing in the research paper? Where the references are mentioned?
- d) How do you add pictures and formula in the technical report writing?
- e) How the table of two rows and two columns are inserted in the research paper?
- f) Name the chart elements in MS Excel.
- g) What is worksheet in MS Excel.
- h) Name any two journals.
- i) Where do you save the power point presentation in computer?
- j) How many types of journals are there? Name any two types of journals.

**Q.3 A) Attempt any Two of the following.** **10**

- 1) What is peer review in research publication? Write the detailed steps for it.
- 2) List the content of the research paper. Briefly explain each section.
- 3) Select any scientific topic and write a scientific writing for the daily newspaper.

**B) Explain the steps involved in preparing technical report writing.** **06**

**Q.4 A) Attempt any Two of the following.** **08**

- 1) A technical topic with proper technical writing is expected.
- 2) A group of 10 people have health benefits by exercise in gym, skipping, yoga, running, walking, dieting practices every day. They scored points from 1 to 50. Prepare a table using MS excel and prepare a pie chart using the scores mentioned in your excel sheet.
- 3) Prepare an origin graph for the characteristics curves of any device by selecting minimum 10 rows and 2 columns.

**B) Explain in detail the procedure of preparing a manuscript for publishing in a standard international level journal.** **08**

**Q.5 Attempt any Two of the following.** **16**

- a) What is the need of scientific words in scientific writing? Explain with minimum eight examples.
- b) Write a steps involved in preparing power point presentation of a research paper in a national level conference. In detail explain the preparation of first slide of the presentation.
- c) What is a project? Explain in detail the procedure to prepare project report.



Seat No.	
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**B.Sc. (Semester - V) (New) (CBCS) Examination- March/April - 2023  
Medical Physics (19201518)**

Day & Date: Friday, 07-07-2023  
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.  
4) Use of log table and calculator is allowed.

**Q.1 A) Choose correct alternatives. 10**

- 1) 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
- 2) Which two number from the binary number system?
  - a) 0 and 2
  - b) 1 and 2
  - c) 0 and 1
  - d) 1 and 3
- 3) In how many generations a computer can be classified?
  - a) 3
  - b) 4
  - c) 5
  - d) 6
- 4) What is the difference between soft and hard X-rays?
  - a) Velocity
  - b) Intensity
  - c) Frequency
  - d) Polarization
- 5) 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 f an element
- 6) Dental X-Ray is also known as \_\_\_\_
  - a) Orthopedics
  - b) Orthopentology
  - c) Orthology
  - d) Orthopantomography
- 7) What properties of sound wave acts like the principle of ultrasound?
  - a) Reflection and Refraction
  - b) Reflection only
  - c) Refraction only
  - d) Propagation
- 8) 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
- 9) 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

- 10) What is the full form of LASER?
- Light Absorbent and Stimulated Emission of Radiations
  - Light Absorbing Solar Energy Resource
  - Light Amplification of Stimulated Emission of Radiations
  - Light Amplification of Singular Emission of Radiations

**B) Fill in the blanks/ Definition/ One sentence answer/ One-word answer/ 06  
Give the name/ predict the product/ Write true/ false.**

- Optic fibers are used in endoscopy.
  - True
  - False
- $T_1$  increase with magnetic field.
  - True
  - False
- Laser energy is used to break up kidney or gallstones in process called?
- What does MRI Stand for?
- Normally Geiger Muller counter uses potential difference of \_\_\_\_\_.
- Flame emission detector is a type of radiation detector.
  - True
  - False

**Q.2 Solve any Eight of the following. 16**

- Define electromagnetic wave.
- Define Doppler Shift.
- What is contact CT Scan?
- What are the features of advantages of PET and X-Ray?
- What is electrocardiogram?
- Define visible and IR radiations.
- What is the input and output Bus?
- Define sound wave?
- Define damping block.
- What is the magnetic resonance?

**Q.3 A) Attempt any Two of the following. 10**

- Explain the function of CPU.
- Explain the application of Laser in medical field.
- What is the magnetization?

**B) Write short notes on sonography. 06**

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

- Explain the computer networking.
- Describe ultrasonic waves from piezoelectric materials.
- What are the types of optical radiation? Explain any one of them.

**B) Describe about GM tube and its working with the help of diagram. 08**

**Q.5 Attempt any two of the following. 16**

- Describe about the x-ray tube and its working with the help of diagram.
- Explain the five types of luminescence.
- What do you mean by medical diagnostic and therapeutic radiation?



- B) Fill in the blank.** **06**
- 1) Petroleum, coal and \_\_\_\_\_ are fossil fuels.
  - 2) Forests and coal are \_\_\_\_\_ natural resources.
  - 3) Natural gas is a \_\_\_\_\_ resource
  - 4) All \_\_\_\_\_ sources of energy are non - renewable.
  - 5) Biodiesel is produced by transesterification of \_\_\_\_\_ and animal fats.
  - 6) Nuclear energy is a form of energy released from the \_\_\_\_\_.

- Q.2 Solve any Eight of the following.** **16**
- 1) What is geothermal power?
  - 2) Discuss the advantages of geothermal plant.
  - 3) Give the advantage of tidal power plant.
  - 4) Mention some organic materials used in biomass plant.
  - 5) Write any two items used as biomass fuels.
  - 6) Differentiate tide and wave.
  - 7) Classify the geothermal sources
  - 8) What are the constituents of biogas?
  - 9) Mention any two advantage of wind energy.
  - 10) Write any two renewable energy resources.

- Q.3 A) Attempt any Two of the following.** **10**
- 1) Discuss advantages of renewable energy resources.
  - 2) Explain Solar Flat Plate collector.
  - 3) Brief describe biomass energy.

**B) Write a short note on renewable energy resources.** **06**

- Q.4 A) Attempt any Two of the following.** **08**
- 1) Briefly describe energies from the ocean.
  - 2) What are the problems associated with OTEC?
  - 3) Differentiate pyrolysis and gasification?

**B) Describe briefly about PV system.** **08**

- Q.5 Attempt any Two of the following.** **16**
- a) What are the main types of OTEC power plants? Describe their working in brief.
  - b) What are the conventional sources of energy and explain briefly.
  - c) Discuss the construction and working of wind turbine and Give applications of wind energy.

Seat No.	
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Set **P**

**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023**  
**Geoinformatics (19201538)**

Day & Date: Friday, 07-07-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 40

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

**Q.1 A) Fill in blanks. 05**

- 1) A trend of fault line can be represented by \_\_\_\_\_ in GIS structural mapping.
  - a) point
  - b) line
  - c) polygon
  - d) none of these
- 2) Sand along river bank show \_\_\_\_\_ tone in the aerial photograph.
  - a) black
  - b) light
  - c) moderate
  - d) bright
- 3) In the high oblique aerial photographs, tilt angle of the axis is \_\_\_\_\_.
  - a) 20<sup>0</sup>-30<sup>0</sup>
  - b) 30<sup>0</sup>-40<sup>0</sup>
  - c) 40<sup>0</sup>-60<sup>0</sup>
  - d) 60<sup>0</sup>-90<sup>0</sup>
- 4) In visible region, the blue light is having a wave length range of \_\_\_\_\_.
  - a) 0.42-0.52  $\mu\text{m}$
  - b) 0.42-0.52  $\mu\text{m}$
  - c) 0.42-0.92  $\mu\text{m}$
  - d) 0.22-0.32  $\mu\text{m}$
- 5) A pocket stereoscope is used to view \_\_\_\_\_.
  - a) Digital satellite data
  - b) microscopic minerals
  - c) fine grained minerals in the field.
  - d) hard copy of aerial data

**B) Answer the following questions in one sentence. 03**

- 1) What point will you get by joining fiducial marks situated on opposite sides of aerial photographs?
- 2) What is the name of point when two or more vector lines intersect?
- 3) What is a point on the ground called which is directly in line of axis of the aerial photograph or camera axis?

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

- a) What is the term used for surveying and mapping using aerial photographs.
- b) Name the two infrared (IR) bands in LANDSAT?
- c) Identify the structure when beds dipping away from a common linear axis.
- d) What is mosaic?
- e) What is the colour of water bodies in IR colour image?

**Q.3 A) Attempt any One of the following. 05**

- 1) What is Atmospheric window?
- 2) Describe various error in flying.

**B) Explain trellis drainage pattern with their significance. 03**

- Q.4 Attempt any two of the following. 08**
- a) Explain in detail overlap? What are their types? Why overlap is required?
  - b) Describe various platforms of remote sensing.
  - c) What is spectral reflectance curve?
- Q.5 Attempt any One of the following. 08**
- a) Define remote sensing and describe any two components of remote sensing.
  - b) Describe any three uses of aerial photographs in Geology.
  - c) Describe tone and texture with examples and uses in identification of features.

Seat No.	
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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023  
LINUX (19201547)**

Day & Date: Friday, 07-07-2023  
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  
4) Use of log tables and calculator is allowed.

**Q.1 A) Multiple choice questions.**

**10**

- 1) "chmod 761 letter" command is equivalent to \_\_\_\_\_.
  - a) chmod u=7, g=6, o=1 letter
  - b) chmod a=761 letter
  - c) chmod u+rwx, g+rw, o+x letter
  - d) chmod ugo=761 letter
- 2) Which command is used in LINUX for description of any command?
  - a) Help
  - b) Man
  - c) Detail
  - d) Desc
- 3) Which of the following commands can be used to mount /mnt/cdrom file system from the /dev/cdrom?
  - a) mount /mnt/cdrom: /dev/
  - b) mount /dev/cdrom /mnt/cdrom
  - c) monunt /dev/ /mnt/cdrom
  - d) umount /dev/cdrom /mnt/cdrom
- 4) If two files on same partition point to the same inode number they are called \_\_\_\_\_.
  - a) Soft links
  - b) Hard links
  - c) Copy links
  - d) Similar link
- 5) Printer in the file structure can be found in \_\_\_\_\_ directories.
  - a) /etc
  - b) /html
  - c) /proc
  - d) /dev
- 6) Which command is used in vi editor, to copy the current line of the file?
  - a) ys
  - b) yc
  - c) yy
  - d) yw
- 7) Which of the following command is used to see the content of "backup.tar" file without extracting it?
  - a) tar-xvf backup.tar
  - b) tar -svf backup.tar
  - c) tar-tvf backup.tar
  - d) tar-dvf backup.tar
- 8) Which of the following is the main Apache configuration file?
  - a) /etc/apache.conf
  - b) /etc/httpd/config
  - c) /etc/httpd/conf/httpd.conf
  - d) /etc/srm.conf





Seat No.	
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**B.Sc. (Semester - V) (New) (CBCS) Examination: March/April-2023  
MS-EXCEL (19201533)**

Day & Date: Friday, 07-07-2023  
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  
4) Use of log tables and calculator is allowed.

**Q.1 A) Choose the correct alternative. 10**

- 1) Excel documents are stored as files called \_\_\_\_\_.  
a) Workgroups                      b) Worktables  
c) Worksheets                      d) Workforce
- 2) What refers to the horizontal cells which can contain information?  
a) Ribbon                              b) Rows  
c) Columns                            d) Horizontal scrollbar
- 3) Which term is used to join the selected cells in one cell?  
a) Filter                                b) Wrap  
c) Pivot                                 d) Merge
- 4) A formula in Excel always begins with an \_\_\_\_\_.  
a) Equal sign                         b) Colon  
c) Comma                              d) Space
- 5) The result is a \_\_\_\_ value either TRUE or FALSE.  
a) Logical                              b) Arithmetic  
c) Algorithm                          d) Logarithm
- 6) Press \_\_\_\_ to bring up search box.  
a) Shift+F3                            b) Shift+ F4  
c) Shift+ F5                          d) None of these
- 7) To minimize the currently selected window, press \_\_\_\_\_.  
a) Ctrl + F11                         b) Ctrl + F12  
c) Ctrl + F9                          d) Ctrl + F10
- 8) \_\_\_\_\_ is the intersection of a row with a column.  
a) Cell                                  b) Row  
c) Column                              d) All of these
- 9) To displays the Find and Replace dialog box, with the Find tab selected press \_\_\_\_\_.  
a) Alt + F                              b) Tab + F  
c) Esc + F                             d) ctrl +F
- 10) In \_\_\_\_ tab you will find AutoSum button.  
a) Formatting tab                    b) Formula tab  
c) Standard tab                      d) Clipboard tab

- B) Fill in the blanks.** **06**
- 1) Press \_\_\_\_\_ to save the active file with its current file name, location, and file format.
  - 2) \_\_\_\_\_ are equations that perform calculations on values in your worksheet.
  - 3) \_\_\_\_\_ function is used to add the values in the function argument.
  - 4) Press \_\_\_\_\_ to undo in MS-EXCEL.
  - 5) \_\_\_\_\_ of the worksheet appears vertically and are identified by letters at the top of the worksheet window.
  - 6) Press \_\_\_\_\_ to select all rows and columns in the worksheet.

- Q.2 Solve any eight of the following:** **16**
- a) Which function is used to calculate sum of numbers?
  - b) Which function is used to find maximum of numbers?
  - c) Write the name of file formats that are used to save a MS-EXCEL file.
  - d) How can you add cells, rows or columns in Excel?
  - e) What is the use of the IF function in Excel?
  - f) Write the function for calculating p. m. f. of binomial distribution with  $n=10$  and  $p=0.8$ .
  - g) Which function is used to calculate mean of numbers?
  - h) Write different charts in MS-Excel.
  - i) Explain what is a spreadsheet?
  - j) Which function is used to generate random numbers?

- Q.3 A) Attempt any two of the following:** **10**
- 1) How will you write the formula for the following?  
- Multiply the value in cell A1 by 20, add 10 in the result, and divide it by 4
  - 2) How do you find averages in MS- excel?
  - 3) Explain MS Excel in brief.

- B) Explain SUM and SUMIF functions.** **06**

- Q.4 A) Attempt any two of the following:** **08**
- 1) What is difference between a function and a formula in Excel?
  - 2) How can you draw 20 random numbers from 0 to 1?
  - 3) What is difference between a function and a formula in Excel?

- B) Write short notes on 'Data' tab in Excel.** **08**

- Q.5 Attempt any two of the following.** **16**
- a) Explain different charts in MS-Excel.
  - b) What are the different types of COUNTIF functions in Excel?
  - c) Explain RAND and RANDBETWEEN functions with examples.



- 4) What are the things of beauty mentioned in the poem?
- 5) What is the poem 'My Last Duchess' about?
- 6) How does Charlotte Bronte ask her readers to look towards life?

**Q.3 Answer any One of the following Questions. 10**

- 1) How can technology literacy Skills help learners in the future?
- 2) What life skills are needed to become a good leader?

**Q.4 As a Sensitive human being, what measures do you take to conserve the environment and how will you educate people about the importance of environment? 10**

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**PHYSICS (Paper - XIV)**  
**Electrodynamics (19201619)**

Day & Date: Tuesday, 20-06-2023  
 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  
 4) Use of log tables and calculator is allowed.

**Q.1 A) Choose correct alternatives from the options. 10**

- 1) The Poisson's equation is \_\_\_\_\_.
  - a)  $\nabla^2 \phi = 0$
  - b)  $\nabla^2 \phi = D$
  - c)  $\nabla^2 \phi = E$
  - d)  $\nabla^2 \phi = \rho/\epsilon_0$
- 2) Laplace's equation is applicable to \_\_\_\_\_.
  - a) charge free region
  - b) region with certain charge distribution
  - c) constant charges
  - d) moving charges
- 3) Self inductance of a straight conductor due to flux inside is \_\_\_\_\_.
  - a)  $\frac{\mu_0}{8\pi}$
  - b)  $\frac{8\pi}{\mu_0}$
  - c)  $8\pi\mu_0$
  - d)  $4\pi\mu_0$
- 4) Generation of motional emf is the principle of \_\_\_\_\_.
  - a) battery
  - b) generator
  - c) photovoltaic cell
  - d) electrostatics
- 5) The mutual inductance per unit of two windings with  $n_1$  and  $n_2$  turns per unit length over a frame of cross sectional area  $A$  is \_\_\_\_\_.
  - a)  $\mu_0 \frac{n_1 n_2}{A}$
  - b)  $\mu_0 \frac{A}{n_1 n_2}$
  - c)  $\mu_0 n_1 n_2 A$
  - d)  $\frac{1}{\mu_0 n_1 n_2 A}$
- 6) The statement 'magnetic free poles do not exist' is justified by Maxwell's equation \_\_\_\_\_.
  - a)  $\vec{\nabla} \cdot \vec{D} = \rho$
  - b)  $\vec{\nabla} \cdot \vec{B} = 0$
  - c)  $\vec{\nabla} \times \vec{H} = \frac{\partial \vec{D}}{\partial t}$
  - d)  $\vec{\nabla} \cdot \vec{E} = 0$
- 7) The nature of electromagnetic wave is \_\_\_\_\_.
  - a) transverse
  - b) longitudinal
  - c) stationary
  - d) square
- 8) When a wave gets reflected from the surface of a denser medium, there occurs a phase change of \_\_\_\_\_.
  - a)  $0^\circ$
  - b)  $45^\circ$
  - c)  $90^\circ$
  - d)  $180^\circ$



**Q.5 Attempt any two of the following.**

- a) Explain the motion of charged particle in crossed, uniform and constant Electric  $\vec{E}$  and magnetic  $\vec{B}$  fields.
- b) State Maxwell's equations in vacuum medium and explain the physical significance.
- c) Establish the law of conservation of energy for electric field and explain meaning of Poynting vector.





- B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**
- 1) For vibrational spectroscopy, selection rule is \_\_\_\_\_.
  - 2) Define ideal solution.
  - 3) Define activation energy.
  - 4) Give statement of law of mass action.
  - 5) Give equation for Gibb's free energy.
  - 6) Define Rayleigh line.
- Q.2 Solve any eight of the following: 16**
- a) Give two applications of rotational spectra.
  - b) Define wave number and wave length.
  - c) Give statement of Raoult's law.
  - d) Define boiling point of liquid.
  - e) Define zeotropic mixture.
  - f) Give one application of Clapeyron-Clausius equation.
  - g) Derive relation between G and A.
  - h) Define consecutive reaction.
  - i) Give two examples of opposing reaction.
  - j) Define temperature coefficient.
- Q.3 A) Attempt any two of the following: 10**
- 1) Sketch and explain molecular energy level diagram.
  - 2) Write short note on fractional distillation.
  - 3) Derive Gibb's Helmholtz equation.
- B) Give the characteristics of third order reaction. 06**
- Q.4 A) Attempt any two of the following: 08**
- 1) Derive equation for rotational energy.
  - 2) Discuss nicotine water system.
  - 3) Explain collision theory.
- B) The yellow light has wavelength  $5.8 \times 10^{-7}$  m. calculate frequency, energy and wave number of light. ( $h = 6.626 \times 10^{-34}$  J.s) 08**
- Q.5 Attempt any two of the following. 16**
- a) Explain the system of miscible liquid pair having minimum boiling point.
  - b) Derive equation for rate constant of third order reaction.
  - c) Derive thermodynamically van't Hoff reaction isotherm.



- 10) Late blight of Potato is caused by \_\_\_\_\_.
- Erysiphae cichoracearumis*
  - Xanthomonas citri*
  - Phytophthora infestans*
  - Alternaria alternata*

**B) Answer the following. 06**

- Define symptoms.
- What is immunity?
- Name the causal organisms of white rust of crucifer.
- Wilt of Pigeon pea occurs on which plant?
- Define hypertrophy.
- Name the host plants white rust of crucifer.

**Q.2 Solve any eight of the following: 16**

- Define disease.
- Name any two bacterial diseases.
- Write the symptoms of grain smut of Jowar.
- Write the control measures of little leaf of brinjal.
- Define host and pathogen.
- Name any two seed born diseases.
- What is necrosis?
- What is aerobiology?
- Write the symptoms of red rot of sugarcane.
- Write the names of any two viral diseases.

**Q.3 A) Attempt any two of the following: 10**

- Write causal organisms and symptoms of Fruit rot disease of Cucurbits.
- Describe the disease Brown rust of Wheat w.r.t. causal organism and symptoms.
- Name the causal organisms and write control measures of Oily spot of Pomegranate.

**B) Write note on - Seed born pathogens. 06**

**Q.4 A) Attempt any two of the following: 08**

- Describe the causes of disease.
- Write the causal organisms and control measures of Downy mildew of grapes.
- Write the causal organism and symptoms of Tikka disease of groundnut.

**B) Explain the importance of plant diseases. 08**

**Q.5 Attempt any two of the following. 16**

- State causal organism and write symptoms and control measures of *Citrus* Canker.
- Describe the scope and importance of aerobiology.
- Describe the classification of plant diseases based on necrotic symptoms.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023  
ZOOLOGY (Special Paper - XIII)**

**Animal Physiology: Life Sustaining Systems (19201627)**

Day & Date: Tuesday, 20-06-2023  
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  
4) Use of log tables and calculator is allowed.

**Q.1 A) Choose the correct alternative from the options. 10**

- 1) Hamburger phenomenon is called \_\_\_\_\_ shift.
  - a) Phosphate
  - b) Nitrate
  - c) Chloride
  - d) Carbonate
- 2) The breakdown of complex food material in to simple form is called \_\_\_\_\_.
  - a) Digestion
  - b) Nutrition
  - c) Excretion
  - d) Emulsification
- 3) Which one of the following is also known as antidiuretic hormone?
  - a) Oxytocin
  - b) Vasopressin
  - c) Adrenaline
  - d) Calcitonin
- 4) Middle part of kidney is called \_\_\_\_\_.
  - a) Cortex
  - b) Medulla
  - c) Hyllus
  - d) Calyx
- 5) The emulsification of fat is carried out by \_\_\_\_\_.
  - a) Intestinal juice
  - b) Bile juice
  - c) Gastric juice
  - d) Pancreatic juice
- 6) Sphygmomanometer instrument is used for measurement of \_\_\_\_\_.
  - a) Hb
  - b) BP
  - c) Pulse rate
  - d) Sugar
- 7) Excretion may be defined as the separation and \_\_\_\_\_ of nitrogenous metabolic wastes from the body.
  - a) Elimination
  - b) Absorption
  - c) Deletion
  - d) Secretion
- 8) Right auricle received \_\_\_\_\_ type of blood.
  - a) Oxygenated
  - b) Oxyhaemoglobin
  - c) Mixed
  - d) Deoxygenated
- 9) Initiation of protein digestion start in the part of digestive system \_\_\_\_\_.
  - a) Mouth
  - b) Stomach
  - c) Small intestine
  - d) Large intestine
- 10) One cardiac cycle required \_\_\_\_\_ time.
  - a) 0.4 sec
  - b) 0.2 sec
  - c) 0.3 sec
  - d) 0.8 sec

- B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**
- 1) Blood pressure in healthy person is \_\_\_\_\_ mmHg.
  - 2) Which instrument is used when kidney function failed?
  - 3) Which respiratory pigment is present in mammalian blood?
  - 4) Middle part of kidney is called \_\_\_\_\_.
  - 5) The origin of heart beat from SA node which is also known as \_\_\_\_\_.
  - 6) Give the name of scientist who first discovered blood groups in rhesus monkey.

- Q.2 Solve any eight of the following: 16**
- a) Emulsification of fat
  - b) Haemerythrin
  - c) Acidic Chyme
  - d) Tidal volume
  - e) Erythroblastosis foetalis
  - f) Diagram of ECG
  - g) Composition of blood
  - h) Bowman's capsule
  - i) Role of ADH hormone during urine formation.
  - j) Cardiac cycle

- Q.3 A) Attempt any two of the following: 10**
- 1) Describe the physiology of gastric digestion.
  - 2) Describe Bohr's effect.
  - 3) Describe in brief haematopoiesis.

- B) Write short notes on- 06**  
Describe ultrastructure of nephron.

- Q.4 A) Attempt any two of the following: 08**
- 1) Describe the chemical and nervous control of respiration.
  - 2) Describe the phenomenon of blood clotting.
  - 3) Describe with neat labeled diagram, the origin and conduction of heart beat.

- B) Write short notes on- 08**  
Describe the mechanism of urine formation.

- Q.5 Attempt any two of the following. 16**
- a) Describe the physiology of digestion in small intestine.
  - b) What are blood groups? Describe types of blood groups in human.
  - c) Describe the process of transport of  $\text{CO}_2$ .

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Special Paper - XIII)**  
**Metric Spaces (19201635)**

Day & Date: Tuesday, 20-06-2023  
 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 correct alternatives for each of the following. 10**

- 1) Which of the following sequence is not in  $\ell^2$ ?
  - a)  $\left\{ \frac{1}{\log n} \right\}_{n=2}^{\infty}$
  - b)  $\left\{ \frac{1}{e^n} \right\}_{n=1}^{\infty}$
  - c)  $\left\{ \frac{1}{\sqrt{n}} \right\}_{n=1}^{\infty}$
  - d)  $\left\{ \frac{1}{n} \right\}_{n=1}^{\infty}$
- 2) The mapping  $\varrho: \mathbb{R} \times \mathbb{R} \rightarrow \mathbb{R}$  defined by  $\varrho(x, y) = |x - y| \forall x, y \in \mathbb{R}$  then  $\varrho$  is called \_\_\_\_\_.
  - a) Discrete metric
  - b) Absolute value metric
  - c) Pseudo metric
  - d) Euclidean metric
- 3) Let  $f$  be non-decreasing function on the bounded open interval  $(a, b)$ , if  $f$  is bounded below on  $(a, b)$  then \_\_\_\_\_.
  - a)  $\lim_{x \rightarrow b^-} f(x)$  exist
  - b)  $\lim_{x \rightarrow b^+} f(x)$  exist
  - c)  $\lim_{x \rightarrow a^-} f(x)$  exist
  - d)  $\lim_{x \rightarrow a^+} f(x)$  exist
- 4) With usual meaning if  $X$  is characteristic function of natural numbers then  $\lim_{x \rightarrow a} X(x)$  for any  $a \in \mathbb{R}$  is \_\_\_\_\_.
  - a) 0
  - b) 1
  - c) Any rational number
  - d) Does not exist
- 5) Which of the following statement is correct?
  - a) The union of infinite number of open sets is open set
  - b) The intersection of infinite number of open sets is open set
  - c) The union of infinite number of closed sets is closed
  - d) All of these
- 6) If  $[0, 1]$  is metric space with absolute value metric then  $B[\frac{1}{4}, \frac{1}{2}]$  is \_\_\_\_\_.
  - a)  $\left[ 0, \frac{3}{4} \right]$
  - b)  $\left[ 0, \frac{3}{4} \right)$
  - c)  $\left( 0, \frac{3}{4} \right]$
  - d)  $\left( 0, \frac{3}{4} \right)$



- Q.3 A) Attempt any two of the following:** **10**
- 1) If  $x = (x_1, x_2), y = (y_1, y_2)$  are any two points in  $\mathbb{R}^2$  Define  $\rho(x, y) = \max\{|x_1 - y_1|, |x_2 - y_2|\}$  then show that  $(\mathbb{R}^2, \rho)$  is metric space.
  - 2) Define closed subset of metric space  $M$  and if  $E$  is any subset of metric space  $M$  then prove that  $\bar{E}$  is closed.
  - 3) If  $M$  has Heine - Borel property then prove that  $M$  is compact.
- B) State and prove Schwarz inequality.** **06**
- Q.4 A) Attempt any two of the following:** **08**
- 1) Prove that in any metric space every convergent sequence is a Cauchy sequence.
  - 2) If  $G_1$  and  $G_2$  are open in metric space  $M$  then prove that  $G_1 \cap G_2$  is also open in  $M$ .
  - 3) If  $f$  is continuous function from compact metric space  $M_1$  in to the metric space  $M_2$  then prove that  $f(M_1)$  is also compact.
- B) State and prove that Picard's fixed point theorem.** **08**
- Q.5 Attempt any two of the following.** **16**
- a) Define metric space and if  $\ell^\infty$  denote the set of all bounded sequences of real numbers and  $x = \{x_n\}_{n=1}^\infty, y = \{y_n\}_{n=1}^\infty$  are in  $\ell^\infty$  then prove that  $\rho(x, y) = \sup_{1 \leq n \leq \infty} |x_n - y_n|$  is metric for  $\ell^\infty$ .
  - b) Prove that  $f$  is continuous at  $a \in \mathbb{R}$  if and only if 
$$\lim_{n \rightarrow \infty} x_n = a \implies \lim_{n \rightarrow \infty} f(x_n) = f(a)$$
  - c) Prove that, the metric space  $M$  is compact if and only if whenever  $\mathcal{F}$  is family of closed subsets of  $M$  with finite intersection property then  $\bigcap_{F \in \mathcal{F}} F \neq \phi$



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**STATISTICS (Special Paper - XIII)**  
**Statistical Inference - II (19201643)**

Day & Date: Tuesday, 20-06-2023  
 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  
 4) Use of log tables and calculator is allowed.

**Q.1 A) Choose correct alternatives from the option. 10**

- 1) Pivotal quantity used for constructing confidence interval for parameter  $\sigma^2$  in case of  $N(\mu, \sigma^2)$  ( $\mu$  known) follows \_\_\_\_\_ distribution.
  - a)  $\chi^2_{(n-1)}$
  - b)  $t$
  - c)  $\chi^2(n)$
  - d)  $F$
- 2) If  $X_1, X_2, \dots, X_n$  is a r.s. from  $N(\mu, \sigma^2)$  ( $\sigma^2$  is known) then,  $100(1 - \alpha)\%$  confidence interval for  $\mu$  will be \_\_\_\_\_.
  - a)  $\left( \bar{X} - Z_{\alpha/2} \frac{\sigma}{\sqrt{n}}, \bar{X} + Z_{\alpha/2} \frac{\sigma}{\sqrt{n}} \right)$
  - b)  $\left( \bar{X} - Z_{\alpha/2} \frac{S}{\sqrt{n}}, \bar{X} + Z_{\alpha/2} \frac{S}{\sqrt{n}} \right)$
  - c)  $\left( \bar{X} - Z_{\alpha/2} \frac{S^2}{\sqrt{n}}, \bar{X} + Z_{\alpha/2} \frac{S^2}{\sqrt{n}} \right)$
  - d) none of these
- 3) To decide about  $H_0$ , SPRT involves \_\_\_\_\_ regions.
  - a) only 1
  - b) only 2
  - c) 3
  - d) 4
- 4) Level of significance is the probability of \_\_\_\_\_.
  - a) Type one error
  - b) Type two error
  - c) both (a) and (b)
  - d) power of a test
- 5) Among all critical regions of size  $\alpha$ , the critical region that minimizes  $\beta$  is called \_\_\_\_\_.
  - a) Best critical region
  - b) Powerful critical region
  - c) minimum critical region
  - d) none of these
- 6) The test  $H_0 : \mu = 70$  against  $H_1 : \mu < 70$  leads to \_\_\_\_\_ tailed test.
  - a) left
  - b) right
  - c) Two
  - d) none of these
- 7) Neyman-Pearson Lemma provides \_\_\_\_\_ critical region (C.R.).
  - a) Unbiased
  - b) admissible
  - c) minimal
  - d) most powerful

- 8) In SPRT decision about the null hypothesis is taken \_\_\_\_\_.
  - a) After each successive observation
  - b) After fixed number of observations
  - c) At least 5-observations
  - d) None of them
- 9) A sequence of symbols shows lack of randomness if there are: \_\_\_\_\_.
  - a) Too many runs
  - b) Too few runs
  - c) Both a and b
  - d) Neither a nor b
- 10) Which of the following Non-parametric test utilizes the empirical distribution function?
  - a) Median test
  - b) Wilcoxon's signed rank test
  - c) Wald-Wolfowitz run test
  - d) Kolmogorov-Smirnov test

**B) Fill in the blank**

**06**

- 1) To obtain 95% confidence limits for a parameter we take  $\alpha =$  \_\_\_\_\_
- 2) Sequential Probability Ratio Test was developed by \_\_\_\_\_.
- 3) The distribution of quantity independent of population parameter is known as \_\_\_\_\_.
- 4) Rejecting null hypothesis when it is true is called \_\_\_\_\_.
- 5) Kolmogorov-Smirnov test is a \_\_\_\_\_ sided test.
- 6) Ordinary sign test utilizes \_\_\_\_\_ distribution.

**Q.2 Solve any eight of the following:**

**16**

- a) Define interval estimation.
- b) Define Power of the test.
- c) State properties of likelihood ratio.
- d) Obtain confidence interval for population mean when sample of size 49 is drawn from  $N(\mu, 16)$  with 5% level of significance, where sample mean is 5.
- e) Define probability of Type two error.
- f) What are the values of A and B in SPRT where  $\alpha = \beta = 0.1$
- g) Explain relative efficiency.
- h) What are the assumptions of Non parametric (NP) tests?
- i) Giving an example define run in the run test.
- j) What is the test statistic for Wilcoxon's Signed Rank test?

**Q.3 A) Attempt any two of the following:**

**10**

- 1) Obtain  $100(1 - \alpha)\%$  confidence interval for mean  $\mu$  of  $N(\mu, \sigma^2)$  distribution when  $\sigma^2$  is unknown.
- 2) If  $x_1, x_2, \dots, x_n$  be a random sample of size  $n$  from a distribution with pdf
 
$$f(x, \theta) = \theta x^{\theta} \quad 0 < x < 1 \quad \theta > 0$$
 Obtain the best critical region for testing  $H_0 = \theta = 1$  against  $H_1 = \theta = 2$
- 3) Obtain SPRT for testing  $H_0 = \lambda = \lambda_0$  against  $H_1 = \lambda = \lambda_1$  where  $(\lambda_1 > \lambda_0)$  and  $\lambda$  is the mean of Poisson distribution.

- B) An urn contains 6 marbles of which  $\theta$  are white and remaining are black. Suppose two marbles are drawn at random without replacement in order to test  $H_0 = \theta = 3$  against  $H_1 = \theta = 4$ .  $H_0$  is rejected if both marbles are white otherwise accepted. Compute size of the test**

**06**

- Q.4 A) Attempt any two of the following:** **08**
- 1) Let  $X_1, X_2, X_3$  are independent drawn from  $N(\mu, 1)$ . Define  $T = \sqrt{3}\left(\frac{X_1+X_2+X_3}{3} - \mu\right)$  Is T a Pivotal quantity?
  - 2) Explain in short Median test.
  - 3) Obtain L.R. test for testing  $H_0: \mu = \mu_0$  against  $H_1: \mu \neq \mu_0$  based on a random sample from  $N(\mu, \sigma^2)$  distribution when both  $\mu$  and  $\sigma^2$  are unknown.
- B) Obtain  $100(1 - \alpha)\%$  confidence interval for difference between means  $(\mu_1 - \mu_2)$  in case of two normal populations  $N(\mu_1, \sigma_1^2)$  and  $N(\mu_2, \sigma_2^2)$  where  $\sigma_1^2$  and  $\sigma_2^2$  both are unknown.** **08**
- Q.5 Attempt any two of the following.** **16**
- a) State and Prove Neyman Pearson Lemma.
  - b) Define UMP test. Construct a UMP test of size  $\alpha$  for testing  $H_0: \theta = \theta_0$  against  $H_1: \theta > \theta_0$  based on a sample of size n from an exponential distribution with parameter  $\theta$ .
  - c) Explain in detail Mann-Whitney nonparametric test.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Special Paper - XIII)**  
**Photogeology & Remote Sensing (19201652)**

Day & Date: Tuesday, 20-06-2023  
 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) Choose correct alternatives from the options. 10**

- 1) A passive sensor uses: \_\_\_\_\_.
  - a) Sun as the source of energy
  - b) Flash light as a source of energy
  - c) Its own source of energy
  - d) None of these
- 2) A cell with 1m spatial resolution covers an area of 1m<sup>2</sup>, whereas a pixel with 0.1m spatial resolution covers an area of: \_\_\_\_\_.
  - a) 0.1m<sup>2</sup>
  - b) 0.001m<sup>2</sup>
  - c) 10cm<sup>2</sup>
  - d) 100cm<sup>2</sup>
- 3) Remote sensing uses which of the following waves in its procedure?
  - a) Electric field
  - b) Sonar waves
  - c) Gamma- rays
  - d) Electro-magnetic waves
- 4) A pocket stereoscope is used to view \_\_\_\_\_.
  - a) Digital satellite data
  - b) hard copy of aerial data
  - c) microscopic minerals
  - d) fine grained minerals in the field
- 5) Bedding plane between limestone and shale in vector format can be represented by \_\_\_\_\_.
  - a) point
  - b) line
  - c) polygon
  - d) all of these
- 6) A unique reflectance pattern of individual object on the earth is called as \_\_\_\_\_.
  - a) spectral signature
  - b) optical sign
  - c) spatial signature
  - d) signature
- 7) Digital Number (DN) of each pixel represent its \_\_\_\_\_ value.
  - a) brightness value
  - b) dimensional
  - c) ground value
  - d) temperature
- 8) Raster data is stored in \_\_\_\_\_ format.
  - a) tabular
  - b) X-Y coordinate
  - c) pixel/grid
  - d) flowchart



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Special Paper - XIII)**  
**Microbial Genetics (19201660)**

Day & Date: Tuesday, 20-06-2023  
 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  
 4) Use of log tables and calculator is allowed.

**Q.1 A) Choose correct alternatives from the options. 10**

- 1) In replication unwinding of DNA is carried out by \_\_\_\_\_ enzyme.
  - a) Topoisomerase
  - b) Primase
  - c) Helicase
  - d) DNA polymerase
- 2) A base pair substitution mutation in which codon specifying for one amino acid is substituted by another codon which specify functionally same amino acid is called as \_\_\_\_\_ mutation.
  - a) Missense
  - b) Non sense
  - c) Frame shift
  - d) Neutral
- 3) "Hot spots" in the rII region of phage T4 indicate that \_\_\_\_\_.
  - a) Increased temperature causes more mutations
  - b) Not all base pairs are CG and AT
  - c) Mutation is totally random along the genome
  - d) Surrounding bases affect the mutation rate of a bp
- 4) \_\_\_\_\_ type of restriction enzyme most commonly used in r-DNA technology.
  - a) Type I
  - b) Type II
  - c) Type III
  - d) Type IV
- 5) A cis-trans complementation test is carried out to identify \_\_\_\_\_.
  - a) If two mutations are allelic in nature
  - b) If two genes interact with one another
  - c) The number of genes influencing phenotype
  - d) To understand the dominance/recessive relationships between alleles
- 6) The chemical nucleotide DNA sequencing also known as \_\_\_\_\_ Method.
  - a) Sanger
  - b) Maxam-Gilbert
  - c) Automated
  - d) Edman
- 7) The process which shows manipulation of proteins by using modern techniques of molecular biology is known as \_\_\_\_\_.
  - a) Protein Engineering
  - b) Genetic Engineering
  - c) genomic library
  - d) DNA library
- 8) DNA fingerprinting was developed by \_\_\_\_\_.
  - a) Francis crick
  - b) El. Khurana
  - c) Alec Jeffrey
  - d) James Watson











- 10) The \_\_\_\_\_ control is used to represent any HTML, plain text, enter, blank space etc. in control tree.
- |           |            |
|-----------|------------|
| a) Label  | b) Text    |
| c) Hidden | d) Literal |

**B) Fill in the blank. 06**

- 1) Ajax stands for \_\_\_\_\_.
- 2) ASP.Net web forms are inherited from \_\_\_\_\_ class.
- 3) By default web server used for executing ANP.Net application is \_\_\_\_\_.
- 4) The \_\_\_\_\_ property of button control is used to assign single method for multiple buttons.
- 5) The last event in web page life cycle is \_\_\_\_\_.
- 6) By default value of CommandType property of command object is \_\_\_\_\_.

**Q.2 Solve any eight of the following: 16**

- a) Explain Table control with an example.
- b) Explain View and Multiview control.
- c) Explain ValidationGroup property.
- d) What is page life cycle?
- e) What is XML? Explain with an example.
- f) What is a Query string?
- g) What is HTTP status code?
- h) Explain the historical development of ASP.Net.
- i) What is AutoPostBack? Give example.
- j) What is assembly? Give types of assembly.

**Q.3 A) Attempt any two of the following: 10**

- 1) What is the SiteMap file? Explain TreeView control with an example.
- 2) Explain User management in detail.
- 3) What is a dynamic compilation? Explain in detail.

**B) What are client-side and server-side validation? Explain each validation control with an example. 06**

**Q.4 A) Attempt any two of the following: 08**

- 1) Explain the UpdatePanel and timer control with example.
- 2) Explain the data reader object with an example.
- 3) How programmatically assign the master page? Explain with an example.

**B) What are different methods for the execution of the command? Explain any two methods with an example. 08**

**Q.5 Attempt any two of the following. 16**

- a) Design a web page that inserts and updates record using stored procedure.
- b) What are application folders? Explain each application folder with example.
- c) What is cookies? Explain cookies in detail with example.

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Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**PHYSICS (Paper-XV)**  
**Materials Science (19201620)**

Day & Date: Wednesday, 21-06-2023  
 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 alternatives from the options. 10**

- 1) Ceramics are \_\_\_\_\_ materials.
  - a) Organic metallic
  - b) Inorganic metallic
  - c) Inorganic non metallic
  - d) None of these
- 2) \_\_\_\_\_ polymers occurs naturally.
  - a) Nylon
  - b) Starch
  - c) PVC
  - d) Teflon
- 3) Cement are example of \_\_\_\_\_ composites.
  - a) Large particle
  - b) Short particle
  - c) Continuous fibre
  - d) Micro particle
- 4) \_\_\_\_\_ technique is used to determine the crystal structure of material.
  - a) SEM
  - b) XRD
  - c) FTIR
  - d) UV-VIS
- 5) PZT means \_\_\_\_\_.
  - a) Phosphor zinc tin
  - b) Lead zirconium titanate
  - c) Potassium zirconium titanate
  - d) None of these
- 6) Applied force per unit cross sectional area of a body is called \_\_\_\_\_.
  - a) Stress
  - b) Hardness
  - c) Strain
  - d) Creep
- 7) The property of material to undergo permanent deformation even after removal of force is called \_\_\_\_\_.
  - a) Hardness
  - b) Plasticity
  - c) Creep
  - d) Ductility
- 8) Bakelite is obtained by reaction of formaldehyde with \_\_\_\_\_.
  - a) Ethene
  - b) Phenol
  - c) Urea
  - d) Styrene



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Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Special Paper - XIV)**  
**Inorganic Chemistry (19201611)**

Day & Date: Wednesday, 21-06-2023  
 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 alternatives from the options. 10**

- 1) \_\_\_\_\_ is the most important ore of lanthanides.
  - a) Monazite sand
  - b) Orthite
  - c) Samarskite
  - d) Cerite
- 2) Actinoids have \_\_\_\_\_ incomplete outermost shells.
  - a) Five
  - b) Four
  - c) Three
  - d) Two
- 3) Superconductors has \_\_\_\_\_ valence electrons.
  - a) 3
  - b) 4
  - c) 1
  - d) 2
- 4) Germanium doped with acceptor atom then it is called as \_\_\_\_\_ semiconductors.
  - a) n-type
  - b) Superconductor
  - c) Mixed oxide
  - d) p-type
- 5) In structure of diborane distance between two boron atoms is \_\_\_\_\_ pm.
  - a) 166
  - b) 133
  - c) 177
  - d) 144
- 6) Metal pipe line can be made \_\_\_\_\_ by applying external E.M.F.
  - a) Active
  - b) Corroded
  - c) Passive
  - d) Shiny
- 7) Tetrameric alkyl lithium has a characteristic \_\_\_\_\_ bonding.
  - a) 2c - 2e
  - b) 3c - 2e
  - c) 4c - 2e
  - d) 5c - 2e
- 8) Name of  $\text{HC}\equiv\text{CNa}$  is \_\_\_\_\_.
  - a) Sodium acetylene
  - b) Sodium ethanide
  - c) Ethylene sodium
  - d) Acetylene sodium
- 9) Metal in metal carbonyls are usually in \_\_\_\_\_ oxidation.
  - a) higher
  - b) higher negative
  - c) higher positive
  - d) zero and low







- 8) *Taq* polymerase enzyme is obtained from \_\_\_\_\_.  
a) *Thiobacillus aquaticus*                      b) *Thermus aquaticus*  
c) *Treponema aquaticus*                      d) *Bacillus anthracis*
- 9) Virus free plants are produced by using \_\_\_\_\_ culture.  
a) xylem    b) leaf  
c) meristem                                        d) bark
- 10) In tissue culture, for surface sterilization \_\_\_\_\_ chemical is used.  
a) 70% ethanol                                      b) 20% NaCl  
c) 10% Sodium acetate                          d) 45% Sodium Tartarate

**B) Answer the following questions in one sentence only.    06**

- 1) A collection of total genomic DNA from a single organism is called \_\_\_\_\_.
- 2) Gene gun is \_\_\_\_\_ method of gene delivery.
- 3) Annealing temperature in PCR is \_\_\_\_\_.
- 4) The plant part to be used for tissue culture is known as \_\_\_\_\_.
- 5) Unorganized mass of cells produced during the tissue culture is known as \_\_\_\_\_.
- 6) \_\_\_\_\_ medium is used as an ideal medium in tissue culture technique.

**Q.2 Answer the following (Any Eight):    16**

- a) Define vector and give any one example.
- b) What are transgenic plants? Give any two examples.
- c) What is the purpose of using PCR in Biotechnology?
- d) What is the purpose of culturing anthers in Biotechnology?
- e) Enlist methods of gene transfer.
- f) What is somatic hybridization?
- g) Enlist the plant hormones used in tissue culture.
- h) What is bacterial transformation?
- i) Enlist the steps in PCR.
- j) Enlist chemicals used for surface sterilization.

**Q.3 A) Answer the following (Any two):    10**

- 1) Write a note on - DNA libraries.
- 2) Write a note on - Marker and Reporter genes.
- 3) Write a note on - Complementation and colony hybridization.

**B) Explain any two vectors used in recombinant DNA technology.    06**

**Q.4 A) Answer the following (Any two):    08**

- 1) Give any four terminologies used in tissue culture.
- 2) Describe the role of Biotechnology in Agriculture.
- 3) Describe the enzymes involved in recombinant DNA technology.

**B) Describe the process of tissue culture.    08**

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

- a) With neat labelled diagram, explain the Polymerase Chain Reaction (PCR).
- b) Write a note on - any two Biotechnological Industries and their role.
- c) With neat labelled diagram, explain Southern Blotting Technique.





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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Special Paper- XIV)**  
**Numerical Analysis (19201636)**

Day & Date: Wednesday, 21-06-2023  
 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 scientific calculators is allowed.

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

**10**

- 1) If  $f(x) = e^x$  then  $\Delta^6 e^x =$  \_\_\_\_\_.
  - a)  $(e^h + 1)^6 e^x$
  - b)  $(e^h - 1)^6 e^x$
  - c)  $(e^h - 1)^6 e^{-x}$
  - d)  $(e^h - 1)^6 e^{2x}$
- 2)  $\left(E^{\frac{1}{2}} + E^{-\frac{1}{2}}\right)(1 + \Delta)^{\frac{1}{2}} =$  \_\_\_\_\_.
  - a)  $\Delta + 1$
  - b)  $\Delta - 1$
  - c)  $\Delta + 2$
  - d)  $\Delta + 3$
- 3) If  $f(x) = 3x^2 - 2x^2 + 1$  then  $\Delta^3 f(x) =$  \_\_\_\_\_.
  - a) 18
  - b) -18
  - c) 8
  - d) -8
- 4) Interpolation is the technique of the estimating the value of a function for any \_\_\_\_\_.
  - a) Intermediate value of the independent variable.
  - b) Intermediate value of the constant
  - c) Intermediate value of technique
  - d) Intermediate value of the dependent variable.
- 5) The Lagrange's interpolation formula for unequal intervals for 'n' points is a polynomial of degree \_\_\_\_\_.
  - a)  $n + 1$
  - b)  $n$
  - c)  $n - 1$
  - d)  $n + 2$
- 6) Using forward difference, the formula for  $f'(a) =$  \_\_\_\_\_.
  - a)  $\frac{1}{h} \left[ \Delta f(a) + \frac{1}{2} \Delta^2 f(a) + \frac{1}{3} \Delta^3 f(a) + \dots \right]$
  - b)  $\frac{1}{h} \left[ \nabla f(a) + \frac{1}{2} \nabla f^2(a) + \frac{1}{3} \nabla f^3(a) + \dots \right]$
  - c)  $\frac{1}{h} \left[ \Delta f(a) - \frac{1}{2} \Delta^2 f(a) + \frac{1}{3} \Delta^3 f(a) - \dots \right]$
  - d)  $\frac{1}{h^2} \left[ \Delta f(a) - \frac{1}{2} \Delta^2 f(a) + \dots \right]$



ii)  $\Delta^2 \left( \frac{5x + 12}{x^2 + 5x + 6} \right)$

- 3) Using Newton's backwards difference formula, construct an interpolating polynomial of degree 3, for the data  
 $f(-0.75) = -0.0718125, f(-0.5) = -0.02475,$   
 $f(-0.25) = 0.3349375, f(0) = 1.10100$   
 hence find  $f\left(-\frac{1}{3}\right)$

- B) Using Simpson's  $\frac{1}{3}$ rd rule to estimate the integral  $\int_0^2 e^{x^2} dx$  taking 06  
 the number 10 intervals.

**Q.4 A) Attempt any two of the followings.** 08

- 1) Prove that  $\mu = \frac{2+\Delta}{2\sqrt{(1+\Delta)}} = \sqrt{\left(1 + \frac{1}{4}\delta^2\right)}$   
 2) The table gives the distance in nautical miles of the visible horizon for the given heights in feet above the earth's surface.

x=height	100	150	200	250	300	350	400
y=distance	10.63	13.03	15.04	16.81	18.42	19.90	21.27

Find the values of y when

- i)  $x = 218$  ft  
 ii)  $x = 410$   
 3) Solve  $y_{n+2} - 4y_n = n^2 + n - 1$

**B) Given that** 08

x:	1.0	1.1	1.2	1.3	1.4	1.5	1.6
f(x):	7.989	8.403	8.781	9.129	9.451	9.750	10.031

Find  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$  at

- 1)  $x = 1.1$   
 2)  $x = 1.6$

**Q.5 Attempt any two of the followings.** 16

- a) State and prove Simpson's 3/8th rule and hence evaluate  $\int_0^1 \frac{x^2}{1+x^3} dx$   
 b) State and prove Lagrange's interpolation formula for unequal intervals and hence find the polynomial  $f(x)$  from the following data.

x :	0	1	2	5
f(x):	2	3	12	147

- c) Solve  
 1)  $y_{x+1}^2 - 3y_{x+1}y_x + 2y_x^2 = 0$   
 2)  $y_{n+2} - 2y_{n+1} + y_n = n^2 2^n$

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Set **P**

**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**STATISTICS (Special Paper- XIV)**  
**Probability Theory (19201644)**

Day & Date: Wednesday, 21-06-2023  
 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 calculators is allowed.

**Q.1 A) Choose the correct alternatives from the options. 10**

- 1) Let  $X_1, X_2, \dots, X_n$  be a random sample from certain distribution. Let  $Y_1 < Y_2 < \dots < Y_n$  be corresponding order statistic. Let  $Z = \min \{X_1, X_2, \dots, X_n - Y_1\}$  Then  $Z$  is called \_\_\_\_\_ order statistic.
  - a) First
  - b)  $n^{\text{th}}$
  - c) Second
  - d) none of these
- 2) Distribution of \_\_\_\_\_ cannot be obtained using order statistics.
  - a) sample median
  - b) sample mean
  - c) Minimum
  - d) sample range
- 3) If  $\{X_n, n > 0\}$  be a sequence of iid  $p(1)$  r.v.s. then  $\sqrt{n}(\bar{x}_n - 1)$  has \_\_\_\_\_ distribution.
  - a)  $P(1)$
  - b)  $P(n)$
  - c)  $N(0, 1)$
  - d) None of these
- 4) A sequence  $\{X_n\}$  is said to be converges in distribution to a r.v.  $X$  if \_\_\_\_\_.
  - a)  $F_n(x) \rightarrow F(x)$  as  $n \rightarrow \infty$
  - b)  $F_n(x) \rightarrow f(x)$  as  $n \rightarrow \infty$   $f(x)$  is *p. d. f.*
  - c)  $F_n \rightarrow 0$  as  $n \rightarrow \infty$
  - d)  $F_n(x) \rightarrow 1$  as  $n \rightarrow \infty$
- 5) W.L.L.N does not hold good for the sequence  $\{X_n\}$  of i.i.d r.v.
  - a) Cauchy
  - b) Chi-Square
  - c) Normal
  - d) Exponential
- 6) In Markov chain state  $j$  is said to be accessible from state  $i$  if \_\_\_\_\_.
  - a)  $P_{ij}^{(n)} = 0$
  - b)  $P_{jj}^{(n)} = 0$
  - c)  $P_{ij}^{(n)} > 0$
  - d) None of these



- 7) Which one of the following is not a one of the possible assumptions of Markov Chain (M.C.)?
  - a) There are finite or countable number of states
  - b) There are finite number of future periods
  - c) A future step depends upon present state and not on past states
  - d) The states are both collectively exhaustive and mutually exclusive
- 8) In a stochastic process the parameter space may be \_\_\_\_\_.
  - a) Discrete
  - b) Continuous
  - c) Discrete or Continuous
  - d) None of these
- 9) In  $M/M/1 : \infty /FCFS$  model the parameter 1 represents \_\_\_\_\_.
  - a) allowable number of customers in queue
  - b) number of customers being served
  - c) number of service channels
  - d) first preference to specific customer
- 10) In queuing theory steady state condition will be achieved if \_\_\_\_\_.
  - a)  $\lambda > \mu$
  - b)  $\lambda < \mu$
  - c)  $\lambda = \mu$
  - d)  $\rho > 2$

**Q.1 B) Fill in the blank**

**06**

- 1) For a random sample of size 5 pdf of first order statistic is given by  $f(y_1) = \underline{\hspace{2cm}}$ .
- 2) The probability density function of the  $n^{th}$  order statistic  $X_{(n)}$  is \_\_\_\_\_.
  - 3) Convergence in law is also called as \_\_\_\_\_.
  - 4) A stochastic matrix is one in which each row sum is \_\_\_\_\_.
  - 5) In usual notations traffic intensity is given by \_\_\_\_\_.
  - 6) In  $M/M/1 : \infty /FIFO$  model, expected waiting time of customers in queue is \_\_\_\_\_.

**Q.2 Solve any Eight of the following**

**16**

- a) Define Order statistic.
- b) Find the c.d.f of first order statistics.
- c) Let  $X_1, X_2, \dots, X_n$  be a random sample of size n from a population having p.d.f.

$$f(x) = \begin{cases} \theta e^{-\theta x} & , x > 0 \\ 0 & , o.w \end{cases}$$

Find the distribution of smallest order statistic.

- d) State Weak Law of Large Number. (WLLN)
- e) Define convergence in probability.
- f) Define finite Markov Chain
- g) State Chapman-Kolmogorov equation.
- h) Give one example of discrete state and discrete time of stochastic process.
- i) State any two assumptions made while deriving probability distribution in queuing system.
- j) Write queue discipline in queuing theory.

**Q.3 A) Solve any two of the following** **10**

- 1) Let  $Y_1 < Y_2 < Y_3 < Y_4$  be a order statistic of a random sample of size 4 from the distribution having p.d.f.

$$f(x) = \begin{cases} 2x & , 0 < x < 1 \\ 0 & , o.w \end{cases} \quad \text{Find } P(Y_3 > 1/2)$$

- 2) Let  $\{X_n\}$  be a sequence of r.vs.  $F_{X_n} = \begin{cases} 1 - \left(1 - \frac{1}{n}\right)^{nx} & x > 0 \\ 0 & o.w. \end{cases}$

Show that  $X_n \xrightarrow{law} X$ , as  $n \rightarrow \infty$ , where  $X$  is  $\exp(1)$  r. v.

- 3) If  $\{X_n, n \geq 0\}$  be a M.C. with 3 states 0, 1, 2 and one step TPM.

$$P = \begin{bmatrix} 3/4 & 1/4 & 0 \\ 1/4 & 1/2 & 1/4 \\ 0 & 3/4 & 1/4 \end{bmatrix} \text{ and initial distribution } P[X_0 = K] = \frac{1}{3}, K = 0, 1, 2$$

find joint distribution of  $X_0$  and  $X_1$

**B) One customer arrives at a counter in a bank after every 15 minutes.** **06**

Staff on the counter takes 10 minutes on an average for serving a customer. Under the assumptions for applying  $M/M/1 : \infty /FCFS$  model, find:-

- 1) Average queue length
- 2) Expected waiting time in the queue.

**Q.4 A) Solve any two of the following** **08**

- 1) Let  $X_i$  be i. i. d.  $P(\lambda)$  then test whether WLLN holds good for this sequence.

- 2) Let  $\{X_n, n \geq 1\}$  be a Markov chain with 3 states 1, 2, 3 with one step TPM

$$P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix} \text{ and initial distribution and initial probability}$$

distribution  $P(X_0 = 1) = 0.7, P(X_0 = 2) = 0.2, P(X_0 = 3) = 0.1$

i)  $P_{13}^{(2)}$

ii)  $P(X_1 = 1)$

- 3) Give any two characteristics of queuing model  $M/M/1:(\infty/FCFS)$

**B) If  $X_n \xrightarrow{p} X$  and  $Y_n \xrightarrow{p} Y$  as  $n \rightarrow \infty$  than show that  $X_n + Y_n \xrightarrow{p} X + Y$  as  $n \rightarrow \infty$**  **08**

also show that  $X_n - Y_n \xrightarrow{p} X - Y$  as  $n \rightarrow \infty$

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

- a) Let  $X_1, X_2, X_3$  be the random samples of size 3 with the distribution having p.d.f.

$$f(x) = \begin{cases} 2x & , 0 < x < 1 \\ 0 & , o.w \end{cases}$$

Find  $P(X_{(1)} \geq m)$  where  $m$  is median.

- b) For a Markov chain  $\{X_n, n \geq 1\}$  one step TPM is as follows.

$$P = \begin{bmatrix} 0 & 1 & 0 \\ p & 0 & q \\ 0 & 1 & 0 \end{bmatrix} \text{ check whether states are recurrent or not.}$$

- c) Customers arrive at a certain petrol pump in a Poisson process with an average time of 5 minutes between arrivals. The time intervals between services at the petrol pump follow exponential distribution and the mean time taken to service a vehicle is 2 minutes.
- 1) find the probability that the pump is idle.
  - 2) what would be the expected queue length?
  - 3) what would be average waiting time in the queue?
  - 4) obtain average time spent by a customer in the system.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**GEOLOGY (Special Paper- XIV)**  
**Geomorphology and Geotectonics (19201653)**

Day & Date: Wednesday, 21-06-2023  
 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) Choose the correct alternatives from the options. 10**

- 1) No major river can erode vertically beyond \_\_\_\_\_.  
 a) Mean Sea Level                      b) local base level  
 c) valley floor                              d) Interfluve
- 2) A steep river with a high discharge and a large supply of readily mobile bedload is likely to have which of the following channel forms?  
 a) Meandering                              b) Straight  
 c) Braided                                      d) Sinuous
- 3) River capture is characteristically present in \_\_\_\_\_ stage.  
 a) Youth                                        b) Mature  
 c) Old    d) none of these
- 4) The concept "The *present is the key to the past*" is given by \_\_\_\_\_.  
 a) Steno                                         b) James Hutton  
 c) W.M. Davis                                 d) W.D. Thornbury
- 5) The end product of normal cycle of erosion is called \_\_\_\_\_.  
 a) Peneplain                                  b) Pedepain  
 c) Monodnock                                 d) all of these
- 6) What is a transform boundary?  
 a) A transform boundary is when two plates collide.  
 b) A transform boundary is when two plates slide past one another.  
 c) A transform boundary is when two plates move toward each other.  
 d) A transform boundary is when two plates pull away from each other.
- 7) What is the lithosphere?  
 a) large, flat stones sitting on top of malleable magma  
 b) the plates that make up the crust and the upper part of the mantle  
 c) the plates that make up the crust  
 d) the upper part of the mantle



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Special Paper- XIV)**  
**Microbial Biochemistry (19201661)**

Day & Date: Wednesday, 21-06-2023  
 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) In protein synthesis, activation of amino acids is carried out by \_\_\_\_\_ enzyme.
  - a) Isomerase
  - b) Protease
  - c) amino acyl tRNA synthetase
  - d) amino acyl transferase
- 2) The pH at which the protein is least soluble is its \_\_\_\_\_ pH.
  - a) Acidic
  - b) Alkaline
  - c) Neutral
  - d) Isoelectric
- 3) \_\_\_\_\_ is initiation codon.
  - a) GUG
  - b) UAG
  - c) CUG
  - d) UAC
- 4) The process of fixing the enzyme on an inert support for repeated use is called \_\_\_\_\_.
  - a) Activation
  - b) Inactivation
  - c) Immobilization
  - d) Inhibition
- 5) \_\_\_\_\_ component is responsible for bioluminescence.
  - a) Luciferin
  - b) Biotin
  - c) Threonine
  - d) Luciferase
- 6) Movement of ribosome by one codon on mRNA is called \_\_\_\_\_.
  - a) Transformation
  - b) Transfection
  - c) Translocation
  - d) Transcription
- 7) Precursor for biosynthesis of purine by de novo pathway is \_\_\_\_\_.
  - a) PRPP
  - b) orotic acid
  - c) Carbamoyl aspartate
  - d) Glucose
- 8) When  $V_0 = \frac{1}{2} V_{max}$  then  $K_m$  is equal to \_\_\_\_\_.
  - a) Enzyme concentration
  - b) substrate concentration
  - c) ES concentration
  - d) product concentration



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS (Special Paper- XIV)**  
**Embedded System Design (19201677)**

Day & Date: Wednesday, 21-06-2023  
 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 alternatives from the options. 10**

- 1) An embedded system consists of minimum a \_\_\_\_\_ device.
  - a) Computing
  - b) Input
  - c) Output
  - d) I/O
- 2) An electronic system designed for \_\_\_\_\_ application is called an embedded system.
  - a) general
  - b) dedicated
  - c) both (a) & (b)
  - d) many
- 3) In C language the Keywords are also called as \_\_\_\_\_.
  - a) Constants
  - b) reserved words
  - c) Variables
  - d) Integers
- 4) The group of similar quantities in C programming is called as \_\_\_\_\_.
  - a) Constant
  - b) Array
  - c) Variable
  - d) Keyword
- 5) In embedded C programming delay time generation technique is \_\_\_\_\_.
  - a) Software delay
  - b) Hardware delay
  - c) Both a) and b)
  - d) RC circuit
- 6) The data range of float variable is \_\_\_\_\_ bytes.
  - a) 8 bytes
  - b) 1 byte
  - c) 2 bytes
  - d) 4 bytes
- 7) The in C programming % sign is \_\_\_\_\_ type of operator.
  - a) Logical
  - b) Relational
  - c) Arithmetic
  - d) Bit wise
- 8) To interface the Relay with 8051 microcontroller, \_\_\_\_\_ is used as switching device.
  - a) Transistor
  - b) Diode
  - c) Capacitor
  - d) Switch i





**Q.5 Answer the following (Any Two).****16**

- a) Describe in detail the designing of an embedded system for speed control of DC motor by using PWM Techniques.
- b) With suitable diagram, describe interfacing of 16 x 2 LCD to 8951 microcontroller.
- c) What is if control statement? Describe in detail if control statement in detail with suitable example.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper- XV)**  
**Advanced Java (19201669)**

Day & Date: Wednesday, 21-06-2023  
 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) Which of the following is used to call stored procedure?
  - a) Statement
  - b) Prepared statement
  - c) Callable statement
  - d) Called statement
- 2) \_\_\_\_\_ driver uses ODBC driver to connect to the database.
  - a) jdbc-odbc bridge driver
  - b) native - api driver
  - c) network protocol driver
  - d) thin driver
- 3) \_\_\_\_\_ is used to execute parameterized query.
  - a) statement interface
  - b) preparedstatement interface
  - c) resultset interface
  - d) None of these
- 4) \_\_\_\_\_ is the extension of Deployment Descriptor file in servlet.
  - a) .java
  - b) .web
  - c) .xml
  - d) .class
- 5) Which cookie it is valid for single session only and it is removed each time when the user closes the browser?
  - a) Persistent Cookie
  - b) Non-persistent Cookie
  - c) Both a and b
  - d) None of these
- 6) Which of the following attributes are mandatory in <jsp:useBean/> tag?
  - a) id, type
  - b) id, class
  - c) type, class
  - d) type, property
- 7) Which of the following method can be used to read a form parameter in JSP?
  - a) request.getParameter()
  - b) response.getParameter()
  - c) request.getValue()
  - d) response.getValue()
- 8) A servlet maintain session in \_\_\_\_\_.
  - a) Servlet Context
  - b) Servlet container
  - c) Servlet response heap
  - d) Servlet request heap

## SLR-QA-241

- 9) Which of the following is the correct syntax to declare comments in JSP?
- a) `<%-- This is JSP comment--%>`
  - b) `<!-- This is JSP comment-->`
  - c) `...//...`
  - d) All of the above
- 10) Which class can handle any type of request means protocol-independent?
- a) `HttpServlets`
  - b) `GenereicServlets`
  - c) Both a & b
  - d) None of Above

**B) Fill in the blank. 06**

- 1) \_\_\_\_\_ object stores references to the request and response objects.
- 2) JSTL stands for \_\_\_\_\_.
- 3) JDBC stands for \_\_\_\_\_.
- 4) \_\_\_\_\_ driver is called as thin-driver in JDBC.
- 5) \_\_\_\_\_ tag is used to execute java source code in JSP.
- 6) \_\_\_\_\_ method is used to specify before any lines that uses the `PrintWriter`.

**Q.2 Answer the following (Any Eight): 16**

- a) What is the JDBC Statement?
- b) Write two Uses of Drivers.
- c) What is mean by CGI?
- d) What is mean by Java Bean?
- e) Define the term Servlet?
- f) What are struts?
- g) What is mean by Hibernate?
- h) Define Session in Servlet?
- i) What is mean by scriplet tag?
- j) Explain `HttpSession` in servlet?

**Q.3 A) Answer the following (Any two): 10**

- 1) Explain Component and features of JDBC.
- 2) Explain Servlet life Cycle in detail.
- 3) Explain the use of prepared statement with example.

**B) Short note on 06**

- 1) `GenericServlet`
- 2) `ResultSet` interface

**Q.4 A) Answer the following (Any two): 08**

- 1) Write Steps to create application of Hibernate.
- 2) Explain features of Struts.
- 3) Explain features of servlet.

**B) Define the term JSP. Explain JSP architecture in detail. 08**

**Q.5 Answer the following (Any Two).****16**

- a) What is cookies and explain advantages and disadvantages of cookies in Servlet?
- b) Explain types of JDBC drivers with suitable example.
- c) Explain Session tracking mechanism in Servlet.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023  
PHYSICS (Paper- XVI)**

**Atomic, Molecular Physics and Quantum Mechanics (19201621)**

Day & Date: Thursday, 22-06-2023  
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)  $m_j$  can have only \_\_\_\_\_ values, from  $-j$  to  $+j$ , excluding zero.
  - a)  $j(j + 1)$
  - b)  $2j + 1$
  - c)  $j(j + 1)$
  - d)  $(2j + 1)$
- 2) The minimum energy of a particle confined to one dimensional rigid box is obtained by substituting  $n$  equal to \_\_\_\_\_.
  - a) one
  - b) zero
  - c) half
  - d) two
- 3) In the spectra of Na, the \_\_\_\_\_ and \_\_\_\_\_ series have same convergence.
  - a) sharp, diffuse
  - b) fundamental, sharp
  - c) principal, sharp
  - d) principal, diffuse
- 4) Pure rotational spectra occur in \_\_\_\_\_ region.
  - a) ultraviolet
  - b) infra-red
  - c) microwave
  - d) x-ray
- 5) The maximum number of electrons in a shell of given quantum number  $n$  is \_\_\_\_\_.
  - a)  $2n$
  - b)  $2n^2$
  - c)  $n^2$
  - d)  $2(2n + 1)$
- 6) To observe Raman effect, molecules must be \_\_\_\_\_.
  - a) Polar
  - b) non-polar
  - c) both a) and b)
  - d) none of these
- 7) The quantity  $\psi\psi^*$  is called \_\_\_\_\_.
  - a) probability density
  - b) probability current density
  - c) reflection coefficient
  - d) transmission coefficient
- 8) If the coupling between  $l^*$  and  $s^*$  is broken in an external magnetic field, then we observe \_\_\_\_\_.
  - a) anomalous Zeeman effect
  - b) strong field Stark effect
  - c) Stark effect
  - d) Paschen back effect



- Q.4 A) Answer the followings (Any two):** **08**
- 1) Show that Hamiltonian operator  $\hat{H}$  commutes with momentum operator  $\hat{P}$  for a free particle.
  - 2) Write a note on zero point energy of linear harmonic oscillator.
  - 3) Determine the energy eigen values of a particle in one dimensional rigid box and explain it with energy spectrum.
- B)** Derive an expression for vibrational energy levels of diatomic molecules and explain vibrational spectra. **08**
- Q.5 Answer the following (Any Two).** **16**
- a) Derive Schrodinger's time independent wave equation for a particle in one dimension.
  - b) Explain anomalous Zeeman effect and obtain an expression for term shift.
  - c) Obtain eigen values of operators  $L^2$  and  $L_z$ .



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**CHEMISTRY (Special Paper - XV)**  
**Organic Chemistry (19201612)**

Day & Date: Thursday, 22-06-2023  
 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) Pyrrole is \_\_\_\_\_ in nature.
 

a) amphoteric	b) acidic
c) basic	d) neutral
- 2) Sugar on hydrolysis gives \_\_\_\_\_.
 

a) glucose + galactose	b) two glucose units
c) fructose + galactose	d) glucose + fructose
- 3) \_\_\_\_\_ vitamin is Fat insoluble.
 

a) A	b) B
c) C	d) D
- 4) Tuberculosis is caused by \_\_\_\_\_ microorganism.
 

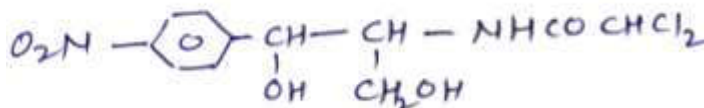
a) M. Leprae	b) P. Vivax
c) M. Tuberculosis	d) P. Falciparum
- 5) \_\_\_\_\_ is an auxo chromic group.
 

a) CO	b) C = C
c) -OH	d) C = S
- 6) \_\_\_\_\_ is natural insecticide.
 

a) Pyrethrum	b) Ethephon
c) Endosulphan	d) Monocrotophos
- 7) Quinoline undergoes sulphonation at position number \_\_\_\_\_.
 

a) 2 & 4	b) 3 & 5
c) 2 & 6	d) 5 & 8
- 8) Mutarotation is observed in \_\_\_\_\_ solvent.
 

a) acidic	b) amphoteric
c) basic	d) neutral
- 9) Name the drug having structure.



- |               |                  |
|---------------|------------------|
| a) Isoniazide | b) Chloromycetin |
| c) Ethambutol | d) Chlorambucil  |

- 10) \_\_\_\_\_ is example of monoazo dye.
- |                   |                    |
|-------------------|--------------------|
| a) Orange IV      | b) Congo red       |
| c) Bismarck brown | d) Malachite green |

**B) Fill in the blanks. 06**

- 1) When mixture of furan, ammonia and steam is passed over heated alumina forms \_\_\_\_\_.
- 2) Killiani's synthesis is used to \_\_\_\_\_ length of carbon chain by one C-atom.
- 3) Hormones initially secreted in blood of animals by \_\_\_\_\_.
- 4) \_\_\_\_\_ is an anticancer drug.
- 5) \_\_\_\_\_ is prepared by condensation of one mole of benzaldehyde with two moles of N, N-dimethylaniline.
- 6) Methyl isocyanate is used in the synthesis of \_\_\_\_\_.

**Q.2 Answer the followings (Any Eight): 16**

- a) Explain acidic character of pyrrole.
- b) How will you convert glucose to fructose?
- c) Write classification of vitamins.
- d) Give synthesis of isoniazide.
- e) Give synthesis of phenolphthalein.
- f) What are agrochemicals, give its example.
- g) Give two methods for preparation of pyridine.
- h) Draw structure of lactose. Give its uses.
- i) Define antibiotic and antimalarial.
- j) Write any two properties of good dye.

**Q.3 A) Answer the followings (Any two): 10**

- 1) What are heterocyclic compounds? How pyrrole is prepared from acetylene and succinimide?
- 2) What is pharmacodynamic agents? How they are classified?
- 3) Give synthesis of Indole-3-acetic acid from acetic acid.

**B) Prove that open chain structure of glucose on analytical basis. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Discuss the classification of carbohydrates.
- 2) Give synthesis of thyroxine.
- 3) Write any four qualities of an ideal drug.

**B) What are carbohydrates? How will you arrive configuration of D-glucose from D-arabinose? 08**

**Q.5 Answer the following (Any Two). 16**

- a) Discuss the structure of vitamin - A on the basis of analytical evidence.
- b) Give classification of dyes based on chemical structure.

c) Give Skraup synthesis.

Complete the following reaction.



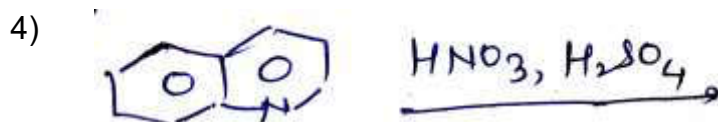
Quinoline



Quinoline



Quinoline



Quinoline

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**BOTANY (Special Paper- XV)**  
**Cell Biology (19201603)**

Day & Date: Thursday, 22-06-2023  
 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.

**Q.1 A) Choose the correct alternatives from the options. 10**

- 1) \_\_\_\_\_ is the part of microscope on which the object of investigation is positioned.
 

a) Lens	b) Diaphragm
c) Stage	d) Mirror
- 2) The scanning electron microscopy is most often used to reveal \_\_\_\_\_.
  - a) surface structures
  - b) internal structures
  - c) both surface and internal structures
  - d) None of these
- 3) The components of prokaryotic cells are \_\_\_\_\_.
 

a) plasma membrane	b) DNA
c) cytoplasm	d) All of these
- 4) The three scientists that contributed to the cell theory are \_\_\_\_\_.
  - a) M. Schleiden, T. Schwann, R. Virchow
  - b) M. Schleiden, T. Schwann, Alberts
  - c) M. Schleiden, W. Sutton, R. Virchow
  - d) Preuss, T. Schwann, R. Virchow
- 5) \_\_\_\_\_ are power house of cell.
 

a) Chloroplasts	b) Ribosomes
c) Lysosomes	d) Mitochondria
- 6) The spindle apparatus is formed during the \_\_\_\_\_ phase of mitosis.
 

a) telophase	b) metaphase
c) prophase	d) anaphase
- 7) The term chromosome was first coined by \_\_\_\_\_.
 

a) Sutton	b) Boveri
c) Waldeyer	d) Hoffmeister
- 8) Cyclin is associated with \_\_\_\_\_.
 

a) Mitosis	b) Cytolysis
c) Glycolysis	d) Leptospirosis



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**ZOOLOGY (Special Paper - XV)**  
**Animal Behavior and Chronobiology (19201629)**

Day & Date: Thursday, 22-06-2023  
 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  
 4) Use of log table and calculator is allowed.

**Q.1 A) Choose correct alternatives 10**

- 1) \_\_\_\_\_ is considered as father of classical conditioning.
  - a) Konrad Lorenz
  - b) Karl von Frisch
  - c) Niko Tinbergen
  - d) Ivan Pavlov
- 2) Building of nest by birds, singing to attract males, territoriality, migration, parental care are examples of \_\_\_\_\_ type of behavior.
  - a) Innate or stereotyped or Instinctive
  - b) Learned Behaviors
  - c) Standardized
  - d) Conventional
- 3) The scientific division of biology that study animal behavior is called as \_\_\_\_\_.
  - a) Applied Zoology
  - b) Ecology
  - c) Ethology
  - d) Ethnology
- 4) Three pioneers in the study of animal behavior-Tinbergen, Frisch and Lorenz received novel prize in the year \_\_\_\_\_.
  - a) 1960
  - b) 1973
  - c) 1999
  - d) 1980
- 5) Birds learning to ignore scare crow is an example of \_\_\_\_\_ behavior.
  - a) Habituation
  - b) Imprinting
  - c) Reflexes
  - d) Conditioning
- 6) In circadian cycle, biological clocks are entrained to day/night cycles that approximate only a \_\_\_\_\_ hour cycle.
  - a) 10
  - b) 20
  - c) 24
  - d) 48
- 7) The environmental factor that drive endogenous biological rhythms is called \_\_\_\_\_.
  - a) Search Image
  - b) Zeitberger
  - c) Migration
  - d) Chemical Cue
- 8) The modification of behavior as a result of experience is called \_\_\_\_\_.
  - a) Orientation
  - b) Ethology
  - c) Learning
  - d) Habituation

- 9) \_\_\_\_\_ hormone is produced in response to darkness.  
 a) Growth Hormone                      b) Melatonin  
 c) Prolactin                                d) Testosterone
- 10) In most species, \_\_\_\_\_ usually invest more in their offspring.  
 a) Siblings                                 b) Male  
 c) Conspecifics                         d) Female

**B) Give one sentence answer to the following. 06**

- 1) Taxis
- 2) Stimuls
- 3) Chronomedicine
- 4) Altruism
- 5) Migration
- 6) Chronobiology

**Q.2 Solve any eight of the following: 16**

- a) Define- kinesis with example.
- b) Define- instinct with example.
- c) Define- imprinting with example.
- d) Melatonin and its function.
- e) Define- altruism with example.
- f) Define- chronotherapy.
- g) Define- courtship.
- h) Define- Chronopharmacology.
- i) Define- reflex with example.
- j) Define- habituation with example.

**Q.3 A) Attempt any two of the following: 10**

- 1) Define Chronobiology and its role in diseases.
- 2) Elaborate on proximate and ultimate causes of behavior with suitable examples.
- 3) Discuss Niko Tinbergen's contributions to the study of animal instincts with an example.

**B) With suitable examples, discuss Konrad Lorenz's contribution in behavioral science. 06**

**Q.4 A) Attempt any two of the following: 08**

- 1) Explain the concept of society with honey bee as an example.
- 2) Write an account on the significance of asymmetry of sex and sexual dimorphism.
- 3) Discuss photoperiod and regulation of seasonal reproduction in vertebrates.

**B) Define mate choice and with suitable examples elaborate intra and intersexual selection. 08**

**Q.5 Attempt any two of the following. 16**

- a) Give a detailed account on the foraging and dance language in honey bees.
- b) Define "associative learning" and discuss classical and operant conditioning with example.
- c) Explain characteristics and types of biological rhythms with their significance.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Special Paper - XV)**  
**Graph Theory (19201637)**

Day & Date: Thursday, 22-06-2023  
 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**

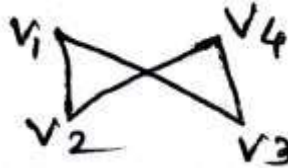
- 1) If  $e = (u, v)$  is a edge in diagraph then  $V$  is called as \_\_\_\_\_.  
 a) Isolated vertex                      b) Terminal vertex  
 c) Initial vertex                         d) None of these
- 2) A vertex is called isolated vertex if and only if it has a degree \_\_\_\_\_.  
 a) 0    b) 1  
 c) 2    d) 3
- 3) In a graph each edge connects two distinct vertices and no two edges connected the same pair of vertices is called \_\_\_\_\_.  
 a) Simple graph                            b) Multigraph  
 c) Pseudo graph                         d) None of these
- 4) Repeated vertex is not allowed in \_\_\_\_\_.  
 a) Walk                                        b) Trail  
 c) Circuit                                      d) Path
- 5) If plane graph has K component then  $n - e + r =$  \_\_\_\_\_.  
 a) K    b) KH  
 c) K-1                                         d)  $K^2+1$
- 6) Sum of degrees of the vertices in undirected graph is \_\_\_\_\_.  
 a) Even                                        b) Odd  
 c) Prime                                       d) None of these
- 7) A tree with 5 vertices has \_\_\_\_\_ edges.  
 a) 6    b) 4  
 c) 5    d) 25
- 8) A tree with \_\_\_\_\_ vertex is called a trivial tree.  
 a) 1    b) 2  
 c) 3    d) 4
- 9) The binary number  $110101_{(2)}$  is equivalent to decimal number \_\_\_\_\_.  
 a) 52    b) 53  
 c) 35    d) 25



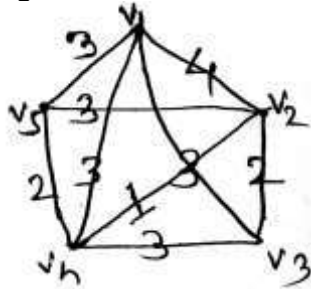


Q.3 A) Answer the followings (Any two): 10

- 1) Show that the maximum number of edges in a simple graph with  $n$  vertices is  $\frac{n(n-1)}{2}$
- 2) Find number of walk of length 3 from  $v_3$  to  $v_1$  and also check the connectedness of the graph.



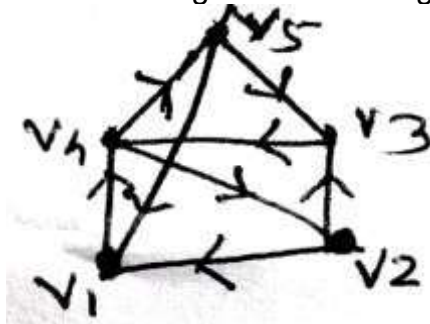
- 3) Find the minimal spanning tree of the weighted graph using Prim's algorithm



B) Convert  $437 \cdot 4375_{(10)}$  to octal also convert  $21 \cdot 673_{(8)}$  to binary. 06

Q.4 A) Answer the followings (Any two): 08

- 1) Write prefix and post fix from the expression  $a + (b * c) - (c/f + e)$
- 2) Show that a simple graph with  $n$  vertices and  $k$  component can not have more than  $\frac{(n-k)(n-kH)}{2}$  edges.
- 3) Find the indegree and out degree of each vertex of directed graph.

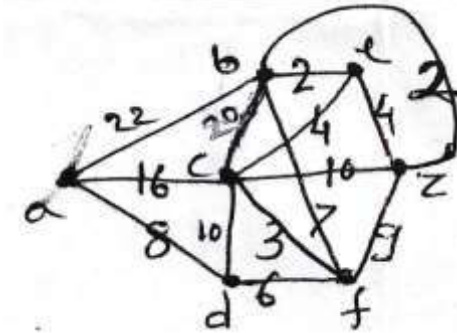


B) Convert 08

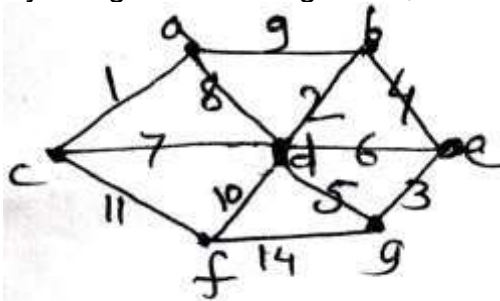
- 1)  $109 \cdot 78125_{(10)}$  to binary
- 2)  $32 \cdot 304_{(5)}$  to decimal
- 3)  $73D5_{(16)}$  to octal
- 4)  $10110100101110_{(2)}$  to hexadecimal

Q.5 Answer the following (Any Two).

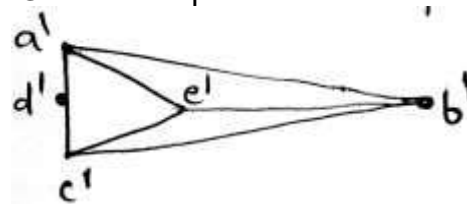
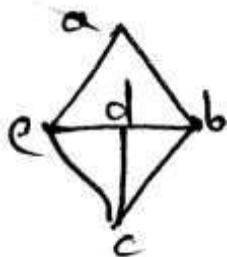
a) Apply Dijkstra's algorithm to the graph. Find shortest path from a to z.



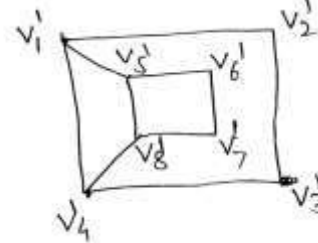
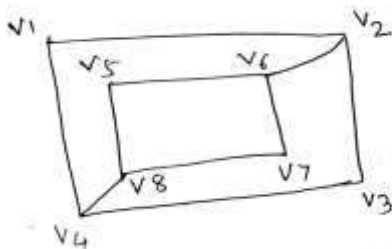
b) By using Kruskal's algorithm, find minimal spanning tree of graph.



c) i) Show that the graph G and G<sup>1</sup> is isomorphic.



ii) Show that following graph G and G<sup>1</sup> is not isomorphic.







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

**16**

- a) State mathematical model, assumptions and analysis of variance table in case of CRD.
- b) Derive the formula for two missing observations in LSD.
- c) Derive the expressions for main and interaction effects in  $2^3$  factorial experiment.



- B) Answer the following. 06**
- 1) Define landslide.
  - 2) Define earthquakes.
  - 3) Define Retention Wall for landslide.
  - 4) Define Bolting for landslide.
  - 5) Define 'greenhouse effect'.
  - 6) Define Flood Plain.
- Q.2 Write answers to any eight of the following. 16**
- a) What is dam failure?
  - b) What is an avalanche?
  - c) What is a water spreading solution?
  - d) What is 'gully plugging'?
  - e) What is gabion structure?
  - f) What is an artificial levee?
  - g) What is channel modification?
  - h) What is the energy budget of earth?
  - i) What is a coastal hazard related to subsidence?
  - j) What is global warming?
- Q.3 A) Attempt any Two of the following. 10**
- 1) Explain the climate like between 30 to 40 degree Latitude.
  - 2) Explain in detail process of channel spreading method application to control floods.
  - 3) Explain five preparedness measures of volcanic hazard.
- B) Write the Hazardous effects of Tsunami. 06**
- Q.4 A) Attempt any Two of the following. 08**
- 1) Role of continuous contour trenching (CCT) in hazard prevention.
  - 2) Explain non-conventional energy resources.
  - 3) Explain the relation of rock type with floods.
- B) Role of vegetation & rock structures in flood and landslide hazards. 08**
- Q.5 Attempt any Two of the following. 16**
- a) Causes & effects of subsidence & prevention measures.
  - b) Explain tropical climate & add note on its coastal nature.
  - c) Explain the hydro thermal energy? Add note on India's potential for the same.



Seat No.	
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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**MICROBIOLOGY (Special Paper- XV)**  
**Clinical Microbiology (19201662)**

Day & Date: Thursday, 22-06-2023  
 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 from the options. 10**

- 1) \_\_\_\_\_ rickettsial disease is transmitted from person to person by the human louse.
 

a) Epidemic Typhus	b) Endemic Typhus
c) Scrub typhus	d) Spotted fever
- 2) \_\_\_\_\_ is antifungal drug.
 

a) Penicillin	b) Nystatin
c) Streptomycin	d) Chloramphenicol
- 3) \_\_\_\_\_ is anaerobic pathogen.
 

a) <i>Proteus vulgaris</i>	b) <i>Klebsiella pneumoniae</i>
c) <i>Escherichia coli</i>	d) <i>Clostridium perfringens</i>
- 4) \_\_\_\_\_ medium is used for cultivation of Rickettsia.
 

a) Nutrient agar	b) Gelatin agar
c) Milk agar	d) Chicken embryos
- 5) Streptomycin was discovered by \_\_\_\_\_.
 

a) W. Beijerinck	b) Joseph Lister
c) Salman Waksman	d) Winogradsky
- 6) Vancomycin inhibit \_\_\_\_\_ synthesis.
 

a) Protein	b) Carbohydrate
c) Cell wall	d) DNA
- 7) Acid fast staining method is used for staining of \_\_\_\_\_.
 

a) Micrococcus	b) Mycoplasma
c) Metabacterium	d) Mycobacterium
- 8) \_\_\_\_\_ is antiviral drug.
 

a) Ampicillin	b) Azidothymidine
c) Azithromycin	d) Neomycin
- 9) \_\_\_\_\_ is a cellular.
 

a) Virus	b) Yeast
c) Mold	d) Rickettsia





- 9) The digital multimeter is capable of measuring \_\_\_\_\_.  
a) ac and dc voltage                      b) ac and dc current  
c) resistance                                d) All of these
- 10) \_\_\_\_\_ is used to observe transient response.  
a) Analog multimeter                      b) Digital multimeter  
c) Cathode Ray Oscilloscope        d) Digital Storage Oscilloscope

**B) Answer the following. 06**

- 1) \_\_\_\_\_ is the heart of CRO.
- 2) Why IC AD620 is used for battery powered portable equipment?
- 3) Collecting the data from some system for a period of time is known as \_\_\_\_\_.
- 4) What is chopper?
- 5) The first stage of data acquisition system is \_\_\_\_\_.
- 6) Which instrument is used to record one quantity with respect to another quantity?

**Q.2 Answer the followings (Any Eight): 16**

- a) What is excitation? Why it is required?
- b) What is shielding? Give its importance.
- c) What is programmable gain amplifier? What is its importance?
- d) Give the salient features of AD594.
- e) Draw the block diagram of single channel DAC.
- f) What is offset compensation?
- g) What is NRZ recording?
- h) Give the advantages of digital data recording.
- i) Draw the circuit diagram of ratiometric conversion.
- j) Draw the pin diagram of IC AD620 and give its pin description.

**Q.3 A) Answer the followings (Any two): 10**

- 1) Explain 4-20 mA current loop used in industries.
- 2) Explain general block diagram for electronic instrument design for measurement.
- 3) Explain LCR-Q meter.

**B) Write a note on X-T recorder. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Explain multi channel data acquisition system.
- 2) Write a note on digital multimeter.
- 3) Explain the working of data logger.

**B) Draw the block diagram of CRO and explain the function of each block. 08**

**Q.5 Answer the following (Any Two). 16**

- a) Explain instrumentation amplifier using op amp. Derive the expression for gain.
- b) With the help of block diagram explain the working of pH meter.
- c) Explain function generator with the help of block diagram.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper- XVI)**  
**Data Communication and Networking – II (19201670)**

Day & Date: Thursday, 22-06-2023  
 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) \_\_\_\_\_ provides a connection-oriented reliable service for sending messages.
  - a) TCP
  - b) IP
  - c) UDP
  - d) All of the above
- 2) Addressing mechanism is done at \_\_\_\_\_.
  - a) Physical Layer
  - b) Data Link Layer
  - c) Application Layer
  - d) None of the above
- 3) HTTP is \_\_\_\_\_ protocol.
  - a) Application layer
  - b) Transport layer
  - c) Network layer
  - d) Physical layer
- 4) The resources needed for communication between end systems are reserved for the duration of Session between end systems in \_\_\_\_\_.
  - a) Packet switching
  - b) Frequency switching
  - c) Line switching
  - d) Circuit switching
- 5) Which transmission media has the highest transmission speed in a network?
  - a) Coaxial cable
  - b) Twisted pair cable
  - c) Optical fiber
  - d) Electrical cable
- 6) Wireless transmission can be done via \_\_\_\_\_.
  - a) Radio waves
  - b) Microwaves
  - c) Infrared
  - d) All of the Above
- 7) Application layer offers \_\_\_\_\_ service.
  - a) End to end
  - b) Process to process
  - c) Both of these
  - d) None of these
- 8) The packet of information at the application layer is called \_\_\_\_\_.
  - a) Packet
  - b) Message
  - c) Segment
  - d) Frame
- 9) A television broadcast is an example of \_\_\_\_\_ transmission.
  - a) Half-duplex
  - b) Simplex
  - c) Full-duplex
  - d) Automatic

- 10) The \_\_\_\_\_ layer is responsible for the process-to-process delivery of the entire message.
- a) Transport
  - b) Physical
  - c) Network
  - d) Data link

**B) Fill in the blank. 06**

- 1) \_\_\_\_\_ is a set of rules that governs data communication.
- 2) \_\_\_\_\_ is a set of procedures used to restrict the amount of data the sender can send before waiting for an acknowledgement.
- 3) Router operates in \_\_\_\_\_ layer of OSI Reference Model.
- 4) The \_\_\_\_\_ layer is the layer closest to the transmission medium.
- 5) A \_\_\_\_\_ is a device that forwards packets between networks by processing the routing information included in the packet.
- 6) The \_\_\_\_\_ is the physical path over which a message travel.

**Q.2 Answer the followings (Any Eight): 16**

- a) Define the term data communication?
- b) Define protocol and standard?
- c) Define the term Amplitude and Bandwidth.
- d) Define the term Distortion and Noise.
- e) What is mean by Framing?
- f) What is mean by Error Control?
- g) What is Data Compression?
- h) What is mean by Network Devices? List out different network devices.
- i) Explain Shannon Capacity Theorem.

**Q.3 A) Answer the followings (Any two): 10**

- 1) What is an error? Explain the types of errors.
- 2) Explain Congestion Control in Datagram Subnets.
- 3) Explain Simplex and Stop and Wait protocol.

**B) Short note on FTP and SMTP. 06**

**Q.4 A) Answer the followings (Any two): 08**

- 1) Explain data flow in detail.
- 2) What is mean by Modulation. Explain Amplitude Modulation?
- 3) What is mean by transmission media. Explain Coaxial Cable transmission media?

**B) Explain the TCP/IP reference model with neat diagram. 08**

**Q.5 Answer the following (Any Two). 16**

- a) Define Multiplexing. Explain the various types of multiplexing?
- b) Explain Distance Vector Routing Algorithm in detail?
- c) Define Switching. Explain different types of Switching?



- 10) In MOSFET, MOS forms a small \_\_\_\_\_.
- |               |                |
|---------------|----------------|
| a) resistance | b) capacitance |
| c) inductance | d) impedance   |

**B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. 06**

- 1) In IC 555 pin no. 3 is \_\_\_\_\_.
- 2) FET is \_\_\_\_\_ controlled device.
- 3) Why the name MOSFET?
- 4) PNP diode is \_\_\_\_\_ junctions device.
- 5) Diac is \_\_\_\_\_ directional device.
- 6) What is Operational Amplifier?

**Q.2 Solve any eight of the following: 16**

- a) Draw the symbols of n and p channel D- MOSFET.
- b) Calculate duty cycle of an IC 555 astable multivibrator, where  $R_A = 3K\Omega$  and  $R_B = 2.5K\Omega$
- c) Compare transfer characteristics of D-MOSFET and E-MOSFET.
- d) Draw the constructional diagram of Diac.
- e) What is Nixie tube?
- f) Define CMRR.
- g) Draw the circuit diagram of Op. Amp.as adder.
- h) Draw pin diagram of IC 741.
- i) IC555 monostable mode consists of  $R = 1K\Omega$  and  $C = 0.01 \mu F$ . Calculate pulse width.
- j) OP AMP is used in inverting mode with  $R_1 = 2K\Omega$  and  $R_2 = 15K\Omega$ . Calculate voltage gain AV.

**Q.3 A) Attempt any two of the following: 10**

- 1) Draw and explain block diagram of operational amplifier.
- 2) Explain construction, working of SCR.
- 3) Op. amp. is used in non-inverting mode with  $R_1 = 2K\Omega$ ,  $R_2 = 10K\Omega$ . Calculate output voltage for input voltage of 100 mV and 2V.

**B) Short note on LED. 06**

**Q.4 A) Attempt any two of the following: 08**

- 1) Explain construction and working of D-MOSFET.
- 2) Design an IC555 astable multivibrator to generate the output signal with frequency 500Hz, duty cycle 80 % and  $C = 0.1 \mu F$ .
- 3) Explain the structure and operation of EPID.

**Q.4 B) Explain functional block diagram of IC555. 08**

**Q.5 Attempt any two of the following. 16**

- a) Explain the applications of IC 555 as square wave generator.
- b) Explain op. amp. as an inverting amplifier.
- c) Explain operation and characteristics of Triac.





- B) Definition.** **06**
- 1) Saponification
  - 2) Thermosetting
  - 3) Masecuite
  - 4) Umpolung
  - 5) Biocatalytic Reactions
  - 6) Rf value
- Q.2 Solve any eight of the following:** **16**
- a) Write the uses of Teepol
  - b) Define the terms.
    - 1) Elastomers
    - 2) Thermoplastics
  - c) Draw a neat labelled block diagram of Gas chromatographic apparatus.
  - d) What are raw materials used in the preparation of soap?
  - e) Applications of phenol - formaldehyde resins
  - f) Write the byproducts of sugar industry.
  - g) Write the synthesis and uses of  $\text{NaBH}_4$ .
  - h) Mention the advantages of Phase Transfer Catalyst (PTC).
  - i) Define the terms.
    - 1) Rectified spirit
    - 2) Absolute alcohol
  - j) What is the general principle of chromatography?
- Q.3 A) Attempt any two of the following:** **10**
- 1) Explain oxidation process by  $\text{OsO}_4$  with mechanism and its applications.
  - 2) What are ionic liquids? Name two examples. What are advantages?
  - 3) Describe crystallisation of sugar.
- B) Write a note on use of Lithium Aluminium Hydride (LAH) in Reduction.** **06**
- Q.4 A) Attempt any two of the following:** **08**
- 1) What are anionic detergents? Give suitable examples.
  - 2) Describe Ziegler Natta polymerisation in detail.
  - 3) What is chromatography? Classify chromatographic methods based on nature of mobile phase and stationary phase.
- Q.4 B) Explain principle, experimental process and applications of Thin Layer Chromatography.** **08**
- Q.5 Attempt any two of the following.** **16**
- a) With a neat labelled diagram discuss the hot process of manufacturing of soap.
  - b) What is addition polymerisation? Discuss in detail the free radical mechanism of polymerisation of alkenes.
  - c) What is meant by fermentation process? How is ethyl alcohol obtained from molasses?

Seat No.	
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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**BOTANY (Special Paper - XVI)**  
**Nursery, Gardening & Horticulture (19201608)**

Day & Date: Friday, 23-06-2023  
 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.

**Q.1 A) Multiple choice questions. 10**

- 1) Which chemical is used for de-greening of fruit?
  - a) IBA
  - b) Cytokinin
  - c) Gibberellic acid
  - d) Ethylene
- 2) Liver red is variety of \_\_\_\_\_.
  - a) Orchid
  - b) Aster
  - c) Anthurium
  - d) Gladiolus
- 3) Vegetative propagation of date palm is through \_\_\_\_\_.
  - a) Runners
  - b) Suckers
  - c) Slips
  - d) Stolon
- 4) Which among these is plant growth retardant?
  - a) Auxin
  - b) Gibberellin
  - c) Abscisic acid
  - d) Cytokinin
- 5) Protray are related to \_\_\_\_\_.
  - a) Post Harvest
  - b) Processing
  - c) Transport
  - d) Nursery
- 6) India is known as home of \_\_\_\_\_.
  - a) Vegetables
  - b) Spices
  - c) Fruits
  - d) Flowers
- 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) Germination of seed while it still remains attached with the parent source \_\_\_\_\_.
  - a) Ovipary
  - b) Apomixis
  - c) Asepsis
  - d) Vivipary
- 10) Queen of flowers is \_\_\_\_\_.
  - a) Orchid
  - b) Gladiolus
  - c) Anthurium
  - d) Rose

- B) Answer the following.** **06**
- 1) What is manure?
  - 2) Enlist the methods of seed dormancy breaking.
  - 3) What are the three types of nurseries?
  - 4) Define pomology.
  - 5) Define olericulture.
  - 6) Define seed bank.
- Q.2 Solve any eight of the following:** **16**
- a) What is sucker?
  - b) Define biofertilizers.
  - c) What are biopesticides?
  - d) What is seed viability?
  - e) Define seed technology.
  - f) Define Patch-Budding.
  - g) Define approach grafting.
  - h) What is scion?
  - i) Define tuber.
  - j) What are cut flowers?
- Q.3 A) Attempt any two of the following:** **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 note on the following.** **06**
- 1) Genetic erosion
  - 2) Home gardening and its types
- Q.4 A) Attempt any two of the following:** **10**
- 1) What are Plant Growth regulators? Describe the role of PGR's in Horticulture.
  - 2) What is Bonsai? Describe in detail method of making Bonsai.
  - 3) What is weed? Describe in detail methods of weed control.
- Q.4 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 Attempt any two of the following.** **16**
- a) What is layering? Describe different types of layering techniques.
  - b) What is floriculture? Describe the importance of flower shows and exhibitions.
  - c) What is seed? Describe the importance of seed testing and seed certification.

Seat No.	
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**B.Sc.(Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**BOTANY (Special Paper - XVI)**  
**Biostatistics (19201609)**

Day & Date: Friday, 23-06-2023  
 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) Multiple choice questions. 10**

- 1) Interpretation of \_\_\_\_\_ problem is called as biostatistics.
  - a) biological
  - b) mathematical
  - c) geological
  - d) algological
- 2) Formulating and testing of hypothesis is an important function of \_\_\_\_\_.
  - a) mathematics
  - b) statistics
  - c) both a and b
  - d) all of these
- 3) Me or Mdn sign is used for \_\_\_\_\_.
  - a) Arithmetic mean
  - b) Median
  - c) Mode
  - d) Deviation
- 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) Classification is the process of dividing things into \_\_\_\_\_ classes.
  - a) different
  - b) similar
  - c) individual
  - d) single
- 6) To collect the data according to quality is called as \_\_\_\_\_ classification.
  - a) quantitative
  - b) qualitative
  - c) both a and b
  - d) none of these
- 7) Standard deviation was first worked out by \_\_\_\_\_.
  - a) Karl Pearson
  - b) Milton Friedman
  - c) Harvey Goldstein
  - d) Herman Hollerith
- 8) Tabulation is divided into \_\_\_\_\_ type.
  - a) one
  - b) two
  - c) three
  - d) four
- 9) Sampling process can be grouped under the \_\_\_\_\_ categories.
  - a) two
  - b) five
  - c) six
  - d) four
- 10) The process of judgement sampling belongs to \_\_\_\_\_ sampling.
  - a) random
  - b) non- random
  - c) both a and b
  - d) all of these

- B) Give the definition of the following. 06**
- 1) What is statistics?
  - 2) Define variables.
  - 3) Give the definition of secondary data.
  - 4) What is mean?
  - 5) Define probability.
  - 6) Give the definition of tabulation.
- Q.2 Solve any eight of the following: 16**
- a) Explain the sample.
  - b) Write on Measurement.
  - c) Give the discrete variable.
  - d) Write the uses of biological sciences.
  - e) Explain the primary data.
  - f) Write on direct personal interview.
  - g) Explain the source of note.
  - h) Explain the continuous variables.
  - i) Write a note on compound events.
  - j) Give the character of  $\chi^2$  test.
- Q.3 A) Attempt any two of the following: 10**
- 1) Write a note on Chi Square Test.
  - 2) Explain the compound and independent event.
  - 3) Describe the merit of standard deviation.
- B) Write short notes any two of the following. 06**
- 1) Standard Deviation
  - 2) Demerit of range
  - 3) Merit of Mode
- Q.4 A) Attempt any two of the following: 08**
- 1) Explain the demerit of median.
  - 2) Write a note on arithmetic mean.
  - 3) Describe the deliberate sampling.
- Q.4 B) Attempt any one of the following. 08**
- 1) Explain the stratified and systematic sampling.
  - 2) Describe the classification of data.
- Q.5 Attempt any two of the following. 16**
- a) Explain the method of collecting secondary data.
  - b) Describe the use of statistics.
  - c) Write the basic principles studied by you.

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**B.Sc.(Semester - VI) (New) (CBCS) Examination: March/April-2023  
ZOOLOGY (Special Paper - XVI)  
Applied Zoology (19201630)**

Day & Date: Friday, 23-06-2023  
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  
4) Use of log tables and calculator is allowed.

**Q.1 A) Multiple choice questions. 10**

- 1) \_\_\_\_\_ is a domestic fowl.
  - a) A bird which lives in a particular region
  - b) A bird of some foreign breed
  - c) A bird kept for obtaining meat and eggs
  - d) A specific bird kept for breeding purposes only
- 2) \_\_\_\_\_ is the term used for breeding of fish in specially constructed tanks and ponds.
  - a) Vermiculture
  - b) Agriculture
  - c) Horticulture
  - d) Pisciculture
- 3) \_\_\_\_\_ species produces silk of the superior quality.
  - a) Attacus atlas
  - b) Bombyx mori
  - c) Attacus ricini
  - d) Antheraea assamensis
- 4) \_\_\_\_\_ is not the economic importance of fish.
  - a) Source of food.
  - b) Source of water
  - c) Good source of vitamins
  - d) Polishing agent
- 5) The generic name of Apis \_\_\_\_\_.
  - a) Fish
  - b) Honey bee
  - c) Lac insect
  - d) Prawn
- 6) Honey is \_\_\_\_\_.
  - a) Nectar of flower
  - b) Nectar stored in honey sac
  - c) Nectar mixed with saliva and Stored in honey sac
  - d) Nectar and Water sucked by honey bee
- 7) \_\_\_\_\_ is the method of transfection for making transgenic animal.
  - a) Transfer of DNA
  - b) Transfer of whole individual chromosome
  - c) Transfer of whole nuclei
  - d) All of above
- 8) Silk fiber is obtained from which stage of silkworm \_\_\_\_\_.
  - a) Egg
  - b) Larvae
  - c) Cocoon
  - d) Adult

- 9) \_\_\_\_\_ is given major importance in dairy farm management.
- Increase in yield and quality of milk
  - Increase in the number of cattles
  - Increase in the number of cows
  - Increase in the number of buffaloes
- 10) \_\_\_\_\_ is not a important component of poultry farm management.
- Disease free breed
  - Proper food
  - Dirty condition
  - Litter management

**B) Give one sentence answer.****06**

- Which insect is used in lac culture?
- Define poultry.
- What is lac culture?
- What is pisciculture?
- Which country has the highest produce of silk?
- Which bee is called the Indian bee?

**Q.2 Solve any eight of the following:****16**

- Give four application of biostatistics in fishery.
- State the function of honey bee.
- State the life cycle of lac insect.
- Give two examples of milk products and state it's preparation.
- State rearing methods of poultry.
- State the significance of transgenic animals.
- Define prawn culture.
- State the law and regulation fishery.
- Define fishing crafts.

**Q.3 A) Attempt any two of the following:****10**

- Describe the different types of honey bees in India.
- Describe the different types of diseases of silkworm.
- Describe the rearing method of poultry.

**B) Short Note****06**

- Types of silk

**Q.4 A) Attempt any two of the following:****08**

- Describe the incubation and hatching of eggs.
- Explain the depletion of fish resources.
- Describe the importance of bee colonies in crop pollination.

**Q.4 B) Explain the different types of method of beekeeping.****08****Q.5 Attempt any two of the following.****16**

- Describe the application and remote sensing of GIS fisheries.
- Explain Sericulture.
- Describe poultry breeds.



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**MATHEMATICS (Special Paper - XVI)**  
**Integral Calculus (19201638-A)**

Day & Date: Friday, 23-06-2023  
 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  
 4) Use of log tables and calculator is allowed.

**Q.1 A) Choose the correct alternative for each of the following. 10**

- 1) Integral  $\int_a^b f(x) dx$  is said to be improper if \_\_\_\_\_.  
 a) both the limits are finite  
 b)  $f(x)$  is bounded  
 c) one or both the limit of integration are infinite  
 d)  $f(x)$  is not bounded in  $[a, b]$
- 2)  $\int_0^1 x^{m-1} (1-x)^{n-1} dx$  is convergent when \_\_\_\_\_.  
 a)  $m > 0, n > 0$   
 b)  $n > 0$   
 c)  $m > 0$   
 d)  $m > 1, n > 1$
- 3)  $\int_1^{\infty} \frac{dx}{x}$  is \_\_\_\_\_.  
 a) convergent  
 b) divergent  
 c) oscillatory  
 d) conditionally convergent
- 4) The integral  $\int_0^{\infty} \frac{x^{2n}}{1+x^{2m}} dx$  is convergent if \_\_\_\_\_.  
 a)  $n < m$   
 b)  $n > m$   
 c)  $n = m$   
 d)  $n \neq m$
- 5) The value of  $\int_0^1 x^3 (1-x)^2 dx$  is \_\_\_\_\_.  
 a)  $\frac{1}{600}$   
 b)  $\frac{1}{60}$   
 c)  $\frac{1}{30}$   
 d)  $\frac{1}{300}$
- 6)  $\int_0^{\pi/2} \sin^3 x \cos^5 x dx =$  \_\_\_\_\_.  
 a)  $\frac{1}{12}$   
 b)  $\frac{1}{10}$   
 c)  $\frac{1}{24}$   
 d)  $\frac{1}{16}$
- 7) If  $D < P < 1$  then  $\sqrt[p]{p} \sqrt[p]{1-p} =$  \_\_\_\_\_.  
 a) 1  
 b)  $\frac{\pi}{2}$   
 c)  $\frac{\pi}{\sin p\pi}$   
 d)  $\frac{p\pi}{\sin p\pi}$



- b) State and prove Abel's test for the improper integral of a product of two function. 06

**Q.4 A) Attempt any two of the following:** 08

1) Solve  $\int_0^2 \frac{dx}{(2x-x^2)}$

2) Show that  $\beta(m, n) = \frac{\Gamma(m) \Gamma(n)}{\Gamma(m+n)}$

3) Find by using the double integration the area of the circle  $x^2 + y^2 = a^2$

B) Show that  $\sqrt{\pi} \Gamma(2m) \Gamma(m) = 2^{2m-1} \Gamma(m) \Gamma(m + \frac{1}{2})$

**Q.5 Attempt any two of the following.** 16

- a) If  $f$  and  $g$  are two positive functions  $[a, b]$  and  $x = a$  is singular point such that  $\lim_{x \rightarrow a} \frac{f(x)}{g(x)} = L$  where  $L$  is a nonzero finite number then show that

$\int_a^b f(x)dx$  and  $\int_a^b g(x)dx$  behave alike.

- b) Using the transformations  $\frac{x^2}{y} = U, \frac{y^2}{x} = V$  find  $\iint x^2 y^2 dx dy$  over the area bounded by four parabolas  $y^2 = 4x, y^2 = 8x, x^2 = 4y, x^2 = 8y$

- c) Solve the following

1) Evaluate  $\Gamma(-1/2) \Gamma(-3/2)$

2) Prove that  $\beta(m, n) = \int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$



- B) Fill in the blanks.** **06**
- 1) Standard ANSI C recognizes \_\_\_\_\_ number keywords.
  - 2) The meaning of the operator “&&” is \_\_\_\_\_.
  - 3) \_\_\_\_\_ is pictorial representation of algorithm.
  - 4) One dimensional array is also called as \_\_\_\_\_.
  - 5) An array index starts with number \_\_\_\_\_.
  - 6) \_\_\_\_\_ is the header file contains maths function.
- Q.2 Attempt any eight of the following:** **16**
- a) What does int main (void) mean?
  - b) If x=37 and y=5 the integer variable then find x/y and x%y.
  - c) What is keyword? List some keyword in C.
  - d) Draw a Block diagram of C-Tokens.
  - e) Explain the size of operator.
  - f) Explain Bitwise operator.
  - g) Write note on the While Statement.
  - h) Explain for statement.
  - i) What is array? List the types of arrays.
  - j) Define Backward jump of goto statement and write its syntax.
- Q.3 A) Attempt any two of the following:** **10**
- 1) Describe the term basic structure of C-programs.
  - 2) Explain increment and decrement operators.
  - 3) Explain the term for matted outputs.
- B)** Discuss two-dimensional array with example. **06**
- Q.4 A) Attempt any two of the following:** **08**
- 1) Write in detail History of C.
  - 2) Give full note on the switch statement.
  - 3) Write a programme to find even number from 1 to 10 by using do while loop.
- B)** Discuss in detail C-data types. **08**
- Q.5 Attempt any two of the following.** **16**
- a) Explain arithmetic and relational operators.
  - b) Discuss the different forms of if statement in details.
  - c) Write a C programme to find the solution of equation  $ax^2 + by + c = 0, a \neq 0$

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**STATISTICS (Special Paper- XVI)**  
**Quality Management and Reliability (19201650)**

Day & Date: Friday, 23-06-2023  
 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  
 4) Use of log tables and calculator is allowed.

**Q.1 A) Multiple choice questions. 10**

- 1) Which charts are particularly more effective for sample size One?
  - a) P-charts
  - b) C-charts
  - c)  $\bar{X}$  & S chart
  - d) CUSUM Chart
- 2) Deming's philosophy had \_\_\_\_\_ principles.
  - a) 10
  - b) 12
  - c) 14
  - d) 20
- 3) EWMA Control charts first introduced by
  - a) Lucas
  - b) Saccucci
  - c) Shewarts
  - d) Roberts
- 4) What is the full form of E in the EWMA chart?
  - a) Exponentially
  - b) Experimentally
  - c) Exactly
  - d) Estimated
- 5) Average Sample number for single sampling plan
  - a) N
  - b) n
  - c) N-n
  - d) None of these
- 6) In acceptance sampling, when there is a finite probability that the lot may be rejected even if quality is actually good is called \_\_\_\_\_.
  - a) producer's risk
  - b) Consumer's risk
  - c) both a) and b)
  - d) None of these
- 7) The structure function of a binary system S takes any one of \_\_\_\_\_ possible values.
  - a) 4
  - b) 2
  - c) 3
  - d) None of these
- 8) EWMA charts are better than Shewhart control charts in detecting the \_\_\_\_\_ shift.
  - a) Large process
  - b) Medium process
  - c) Small process
  - d) Every process
- 9) When we accept the lot in single sampling plan
  - a)  $d < c$
  - b)  $d \leq c$
  - c)  $d > c$
  - d) None of these
- 10) DMAIC is often associated with \_\_\_\_\_.
  - a) Acceptance sampling
  - b) Kaizen board
  - c) Five- Sigma
  - d) Six -Sigma

- B) Fill in the Blanks.** **06**
- 1) TQM stands for \_\_\_\_\_.
  - 2) Range of  $\lambda$  in EWMA expression.
  - 3) Number of dimensions of quality \_\_\_\_\_.
  - 4) AOQ stands for \_\_\_\_\_.
  - 5) The structure function of a binary system S takes any one of \_\_\_\_\_ possible values.
  - 6) A set of components whose functioning ensures the functioning of the system is known as \_\_\_\_\_.
- Q.2 Solve any Eight of the following (Two marks each)** **16**
- a) What is the meaning of quality?
  - b) What is ATI?
  - c) State magnificent tools of statistical Process Control (SPC).
  - d) Define 100% inspection.
  - e) Define Series System.
  - f) Define Consumer's risk.
  - g) Explain scatter plot or diagram in short.
  - h) Define LTPD.
  - i) Define sample inspection.
  - j) Define a Structure function of a system of n components.
- Q.3 A) Attempt any two of the following:** **10**
- 1) Write a note on magnificent tool of quality- Control Chart.
  - 2) State the control limits of EWMA control chart for monitoring process mean.
  - 3) Show that hazard rate of a series system of components having independent life times is summation of component hazard rates
- B)** In a single sampling plan if sample size  $n = 10$ , acceptance number  $C = 2$ , and lot quality  $p = 0.08$ , find the probability of accepting the lot by using binomial distribution. **06**
- Q.4 A) Attempt any two of the following:** **08**
- 1) Write the advantages of Accepting sampling.
  - 2) State the control limits of EWMA control chart for monitoring process mean.
  - 3) Find the structure function of a parallel system of n components.
- B)** Explain the Tabular CUSUM for monitoring the process mean. **08**
- Q.5 Attempt any two of the following.** **16**
- a) Write a note on magnificent tool of quality- Cause and effect diagram.
  - b) Explain Double Sampling plan.
  - c) Find the failure rate function (hazard rate) for a 2-out-of-3 system, where components are independent and life time  $T_i$ , of  $i^{th}$  component is exponentially distributed with mean 100 hrs, for  $i = 1,2,3$ .

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**Statistics (Special Paper- XVI)**  
**Time Series Analysis (19201651)**

Day & Date: Friday, 23-06-2023  
 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 from the following. 10**

- 1) Value of  $a$  in the trend line  $Y = a + bX$  is \_\_\_\_\_.
  - a) Always negative
  - b) Always positive
  - c) Always zero
  - d) Can be negative or positive
- 2) The long term movement of time-series is \_\_\_\_\_.
  - a) Trend
  - b) cyclical variation
  - c) seasonal variation
  - d) Noise
- 3) The \_\_\_\_\_ data is defined as the original time series data with the estimated seasonal component removed.
  - a) Seasonalised
  - b) Seasonal
  - c) Deseasonalised
  - d) None of these
- 4) Increase in the number of patients in the hospital during rainy season is \_\_\_\_\_.
  - a) Secular trend
  - b) Irregular variation
  - c) Seasonal variation
  - d) Cyclical variation
- 5) There are \_\_\_\_\_ components in the time series.
  - a) One
  - b) Two
  - c) Three
  - d) Four
- 6) The loss of crops due to heavy flood is an example of \_\_\_\_\_.
  - a) Secular trend
  - b) Seasonal movements
  - c) Cyclical variations
  - d) Irregular variation
- 7) A trend is the better fitted trend for which the sum of squares of residuals is \_\_\_\_\_.
  - a) Maximum
  - b) Minimum
  - c) Positive
  - d) Negative
- 8) An orderly set of data arranged in accordance with their time of occurrence is called \_\_\_\_\_.
  - a) Arithmetic series
  - b) Harmonic series
  - c) Geometric series
  - d) Time series
- 9) Moving averages remove the cyclical variation if \_\_\_\_\_.
  - a) the average is weighted
  - b) the period is even
  - c) the period is odd
  - d) the period is same as that of cycle



- 10) Exponentially Weighted Moving Averages (EWMA) method is also called as \_\_\_\_\_.  
 a) Method of Exponentiation      b) Exponential smoothing  
 c) Progressive averages            d) None of these

**B) Fill in the blank. 06**

- 1) The fitted trendline is said to be best, if the sum of squares of residuals is \_\_\_\_\_.
- 2) In time series analysis, the independent variable is \_\_\_\_\_.
- 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) The longform of MA model is \_\_\_\_\_.
- 6) The longform of AR model is \_\_\_\_\_.

**Q.2 Solve any Eight of the following. 16**

- 1) Define MA(2) model.
- 2) State multiplicative model of a time series. Also describe every term involved in it.
- 3) How many components are there for a time series? List down all components.
- 4) Define auto-correlation function.
- 5) When do we call a time series as a stationary time series?
- 6) Define AR(1) model.
- 7) Define seasonal variation. Also give examples of this kind of variation.
- 8) What are the merits of moving average method?
- 9) Define trend of a time series.
- 10) What are the demerits of least square method?

**Q.3 A) Attempt any Two of the following. 10**

- 1) Write a note on method of progressive averages.
- 2) Discuss link relative method.
- 3) Describe run test for checking randomness of a series against trend and seasonality.

**B) Attempt the following. 06**

Discuss utility of time series analysis.

**Q.4 A) Attempt any Two of the following 08**

- 1) Explain the difference between cyclic variation and seasonal variation.
- 2) Describe auto-covariance function. Also state its properties.
- 3) Discuss ratio to moving average method.

**B) Attempt the following. 08**

Describe exponential smoothing.

**Q.5 Attempt any Two of the following. 16**

- a) Discuss merits and demerits of ratio to moving average method.
- b) Describe least square method for trend estimation.
- c) Write down the estimation procedure for parameters of MA(2) process.



## SLR-QA-262

- 8) Elements are those of the B subgroup whose ions have 18-electron in the outer shell are \_\_\_\_\_.  
a) Siderophile                      b) Chalcophile  
c) Lithophile                        d) Atmosphere
- 9) Geochemical processes operate only because of \_\_\_\_\_.  
a) Presence of various chemical on the earth's crust.  
b) Water circulation system.  
c) A flow of energy from a higher to a lower potential or intensify.  
d) High pressure in the crust
- 10) The upper crust of the earth mainly consists of \_\_\_\_\_.  
a) Sandstone                        b) Shale  
c) Limestone                        d) Igneous and metamorphic rocks

**B) Define the following.**

**06**

- 1) Isotone
- 2) Secular change
- 3) Solid solution
- 4) Colloids
- 5) Captured
- 6) Radiogenic isotopes

**Q.2 Solve any Eight of the following.**

**16**

- 1) List the four most abundant elements in average composition of igneous rocks.
- 2) Give the any two examples of isomorphism.
- 3) List the types of radioactivity.
- 4) Name the types of colloidal system.
- 5) Name the trace elements in igneous rocks.
- 6) List the types of chemical bonding.
- 7) Name the first series transition metals.
- 8) Give the examples of hydrophilic sol.
- 9) Name kinds of solid solution based on the mechanism that causes variation in chemical composition.
- 10) Give the example of covalent bonding.

**Q.3 A) Attempt any two of the following:**

**10**

- 1) Write note on Stony iron meteorites.
- 2) Discuss in detail the geological applications of Isotopes.
- 3) Explain in brief the geochemical periodic table.

**B) Write short note on evolution of earth.**

**06**

## SLR-QA-262

- Q.4 A) Attempt any Two of the following: 08**
- 1) Discuss in short Ur-Th-Pb method of dating the geologic event.
  - 2) Write short note on Polymorphism with suitable example.
  - 3) Explain in brief cosmic abundance of elements with suitable diagram.
- B) Define stable isotopes. Explain in brief the types of stable isotopes. 08**
- Q.5 Attempt any two of the following: 16**
- a) Discuss in short the average chemical composition of igneous rocks.
  - b) Explain in details the Goldsmith's classification of elements.
  - c) Discuss in brief the different types of radioactivity. Add note on radioactive decay.



- B) Answer the following questions. 06**
- 1) In Primary oil recovery \_\_\_\_\_ % oil is recovered.
  - 2) Name the commercial methods used for bioleaching.
  - 3) List two important organisms involved in bioleaching process.
  - 4) Xanthan gum produced by microorganisms is used for \_\_\_\_\_.
  - 5) In B.O.D test liberated \_\_\_\_\_ is titrated against sodium thiosulphate.
  - 6) Name the organism responsible for Zoogloal film formation.
- Q.2 Write any eight of the following. 16**
- a) Define bioremediation.
  - b) Write classification of lakes on the basis of nutrient level.
  - c) Give characteristics of Distillery industry waste.
  - d) Define Alkali philes with examples.
  - e) Define B.O.D. and C.O.D.
  - f) Explain carbon sequestration.
  - g) Significance of microorganisms in air.
  - h) Define equalization.
  - i) Name different committees involved in regulatory framework of biosafety in India.
  - j) Explain sedimentation step in waste water treatment.
- Q.3 A) Attempt any two of the following. 08**
- 1) Write about characteristics of marine organisms.
  - 2) Explain Sludge digestion.
  - 3) Give flow sheet of treatment of paper and pulp industry waste.
- B) Give an account of general characteristics and importance of extremophiles-thermophiles, Psychrophiles and acidophiles. 08**
- Q.4 A) Attempt any two of the following. 10**
- 1) Write in detail Microbially enhanced oil recovery (MEOR).
  - 2) Write on characteristic and treatment of textile industry waste.
  - 3) Describe various methods of sampling of air.
- B) Write on sources, effects and control of 'Eutrophication.' 06**
- Q.5 Attempt any two of the following. 16**
- a) Explain 'Bioleaching' with special reference to copper leaching.
  - b) Write an essay on biological safety.
  - c) Write in detail about secondary treatment of sewage.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**ELECTRONICS (Special Paper- XVI)**  
**Modern Communication Systems (19201684)**

Day & Date: Friday, 23-06-2023  
 Time: 03:00 PM To 06:00 PM

Max. Marks: 80

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

**Q.1 A) Select the correct alternative from the following. 10**

- 1) A satellite is kept in the orbit by balancing between two forces \_\_\_\_\_.
  - a) Centripetal force and centrifugal force
  - b) Magnetic force and Centripetal force
  - c) Centripetal force and gravitational force
  - d) Electric force and gravitational force
- 2) The channel width of transmitter in cell phone system is \_\_\_\_\_.
  - a) 60 KHz
  - b) 30 KHz
  - c) 30 MHz
  - d) 60 MHz
- 3) Fastest LAN topology is \_\_\_\_\_.
  - a) Ring
  - b) Bus
  - c) Star
  - d) Square
- 4) When speed of radio signal is known, radar is used to determine \_\_\_\_\_ of target.
  - a) altitude
  - b) direction
  - c) range
  - d) position
- 5) Photo diode operated with \_\_\_\_\_ bias.
  - a) forward
  - b) reverse
  - c) forward and reverse
  - d) None
- 6) Earth station is used \_\_\_\_\_.
  - a) To control satellite position in geostationary
  - b) To control TV satellite signal
  - c) To transmit TV signal
  - d) To receive the TV signal
- 7) Cellular phone uses \_\_\_\_\_ operation.
  - a) simplex
  - b) duplex
  - c) full duplex
  - d) triplex
- 8) Start and stop bit are used with \_\_\_\_\_ data.
  - a) Synchronous
  - b) Asynchronous
  - c) Random
  - d) None
- 9) Permanent bond in optical fiber is \_\_\_\_\_.
  - a) Joinder
  - b) Binder
  - c) Splicing
  - d) Connector

- 10) A micro wave diode with N type silicon cathode and metal anode forming junction is \_\_\_\_\_ Diode.
- a) Gunn
  - b) Schottky
  - c) Tunnel
  - d) varactor

**B) Answer in one sentence.****06**

- 1) What is transponder?
- 2) What are the types of splicing techniques used in optical fiber?
- 3) Explain the function of MTSSO in cellular system.
- 4) Define URL and HTTP.
- 5) What is RADAR? What are its types?
- 6) Define domestic and global satellite.

**Q.2 Solve any eight of the following.****16**

- a) Define baud rate and power calculation used in optical fiber communication.
- b) Give any two advantages and disadvantages of micro wave.
- c) What are different data codes used in digital communication.
- d) What is roll of control unit in cell phone?
- e) What is satellite communication?
- f) List any four applications of optical fiber communication.
- g) What is cavity resonator?
- h) What is computer networking? What are its types.
- i) List the applications of internet communication.
- j) What is roll of duplexer in satellite earth station?

**Q.3 A) Attempt any two of the following.****10**

- 1) What is network topology? What are its types? Explain any one of the topologies.
- 2) What is optical fiber? Explain its types.
- 3) Explain cellular communication system.

**B) Explanation transmission lines used for micro wave communication.****06****Q.4 A) Attempt any two of the following.****08**

- 1) How satellite orbit is selected?
- 2) Explain serial and parallel communication used in digital data communication.
- 3) Explain the need of light for optical communication.

**B) What is modem? What are its types? Explain QPSK modem with necessary block diagram.****08****Q.5 Attempt any Two of the following.****16**

- a) Explain Klystron tube used for micro wave communication.
- b) Explain cell phone with necessary block diagram.
- c) Explain the applications of satellite communication.



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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**COMPUTER SCIENCE (Paper- XVII)**  
**Advanced Python (19201671)**

Day & Date: Friday, 23-06-2023  
 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. 10**

- 1) Which of the following widget is used in the GUI to construct input fields?
  - a) Input
  - b) Entry
  - c) Accept
  - d) Scanner
- 2) \_\_\_\_\_ that can contain text and can perform an action when clicked.
  - a) Label
  - b) Textbox
  - c) Button
  - d) Frame
- 3) Which of the following argument is required to perform connection in the database connectivity?
  - a) Username
  - b) Password
  - c) Database name
  - d) All of these
- 4) What provides two-way communication between two different programs in a network.
  - a) Socket
  - b) HTTP
  - c) Port
  - d) Protocol
- 5) Which of the following is not the property of Button class?
  - a) fg
  - b) bg
  - c) bd
  - d) pd
- 6) Which method of the socket module allows a server socket to accept requests from a client socket from another host?
  - a) Socket.acceptSocket
  - b) Socket.SendTo
  - c) Socket.accept
  - d) Accept.socket
- 7) Which of the following is not part of the Django architecture?
  - a) Model
  - b) View
  - c) Task
  - d) Template
- 8) \_\_\_\_\_ method run the SQL query and return the result.
  - a) execute()
  - b) executeQuery()
  - c) executeNonQuery
  - d) runQuery()
- 9) Which of the following is the advantage of Django framework?
  - a) High scalability
  - b) Rapid web development
  - c) Portability
  - d) All of these
- 10) \_\_\_\_\_ is used as a container.
  - a) Canvas
  - b) Frame
  - c) both a and b
  - d) None of these

**B) Fill in the blanks.****06**

- 1) \_\_\_\_\_ is a standard GUI library for Python using which we can build desktop apps.
- 2) \_\_\_\_\_ widget is used in the GUI to draw shapes.
- 3) \_\_\_\_\_ is used to execute the SQL statements in Python.
- 4) In Python \_\_\_\_\_ is a web framework that allows to quickly create efficient web pages.
- 5) \_\_\_\_\_ python library is used to send and receive data over HTTP.
- 6) \_\_\_\_\_ allows Python programs to access MySQL databases.

**Q.2 Answer any Eight of the following.****16**

- a) Give the advantages of MySQL connector in python.
- b) What is spinbox in tkinter?
- c) Give the use listbox widget in tkinter.
- d) Define migrate. Write a command to migrate the Django app.
- e) Give the benefits of Django framework.
- f) Define Socket? Write a syntax to create socket object.
- g) Define URL? Give its example.
- h) Define XML? Give syntax to declare XML tag.
- i) Define Entry widget in tkinter.
- j) What is URL routing in Django?

**Q.3 A) Attempt any Two of the following.****10**

- 1) Explain any two Python Containers.
- 2) Explain the tkinter event and bindings with example.
- 3) Design a GUI application to draw line, oval, rectangle and polygon using Canvas.

**B) Write note on.****06**

Architecture of Django.

**Q.4 A) Attempt any Two of the following.****16**

- 1) Explain the different Layout management methods in GUI Programming.
- 2) Write a Python GUI application to add and delete a record from student table using stored procedure.
- 3) Explain the following widgets in detail.
  - i) Label
  - ii) Checkbutton
  - iii) Radiobutton

**Q.5 Attempt any Two of the following.****16**

- a) Explain different steps to connect python application to the database.
- b) Design a Django application to display 'Hello World!' on Web Page.
- c) Explain the different steps for creation of client Socket using TCP/IP.

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**B.Sc. (Semester - VI) (New) (CBCS) Examination: March/April-2023**  
**Software Testing (19201671-01)**

Day & Date: Saturday, 01-07-2023  
 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. 10**

- 1) Which of the following is not a valid phase of SDLC (Software Development Life Cycle)?
  - a) Requirement Phase
  - b) Testing Phase
  - c) Abstraction Phase
  - d) Design Phase
- 2) White box testing is related to the boundary value analysis.
  - a) True
  - b) False
- 3) Which of the following is not a part of Software Testing Life Cycle?
  - a) Testing Planning
  - b) Requirement Gathering
  - c) Test Design
  - d) Testing Closure
- 4) Bugs are those software mistakes that occurred during the coding phase.
  - a) True
  - b) False
- 5) Which of the below testing is executed without documentation and planning is known as?
  - a) Regression Testing
  - b) Adhoc Testing
  - c) Unit Testing
  - d) Integration Testing
- 6) Which of the following testing is also known as white-box testing?
  - a) Structural testing
  - b) Design based testing
  - c) Both a and b
  - d) None of these
- 7) System testing is a \_\_\_\_\_.
  - a) Black box testing
  - b) White box testing
  - c) Grey box testing
  - d) None of these
- 8) Regression testing can be used not only for testing the correctness of a program, but often also for tracking the quality of its output.
  - a) True
  - b) False
- 9) Performance testing explores several system qualities, that can be simplified to \_\_\_\_\_.
  - a) Speed
  - b) Capacity
  - c) Stability
  - d) All of these
- 10) Which of the following is a part of the Test Plan?
  - a) Schedule
  - b) Risk
  - c) Both a and b
  - d) None of these

- B) Fill in the blank.** **06**
- 1) \_\_\_\_\_ testing is related to black-box testing.
  - 2) SDLC stands for \_\_\_\_\_.
  - 3) White box testing techniques are \_\_\_\_\_.
  - 4) "V" model is \_\_\_\_\_ testing model.
  - 5) The key objective of Integration testing is \_\_\_\_\_.
  - 6) \_\_\_\_\_ is a functional testing.
- Q.2 Answer any eight of the following.** **16**
- a) Give any two use of software testing.
  - b) What is soak testing?
  - c) What is the difference between a Bug and a Defect?
  - d) Give the meaning of Boundary Value Analysis.
  - e) Define stress testing.
  - f) Give the advantages of Spiral Model.
  - g) Define prototyping.
  - h) Characteristics of Good Test Case.
  - i) Disadvantages of White box testing.
  - j) Advantages of black box testing.
- Q.3 A) Attempt any two of the following.** **10**
- 1) Explain the Hybrid Model.
  - 2) Explain the concept of Defect life cycle.
  - 3) Explain bottom-up integration strategies.
- B) Write short note on.** **06**
- 1) System Testing
  - 2) Top Down Incremental Integration Testing
- Q.4 A) Answer any Two of the following.** **08**
- 1) What is the difference between a Test Plan and a Use Case?
  - 2) Explain in detail Adhoc testing.
  - 3) Explain a testing life cycle with illustration.
- B) Explain Errors, Faults, and Failures in the process of programming and testing with the diagram.** **08**
- Q.5 Attempt any two of the following.** **16**
- a) Explain the phases of fundamental test process.
  - b) What is software testing? Why it is important in SDLC?
  - c) Explain in detail Waterfall model.