SLR-DA-1

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
ENGLISH (COMPULSORY)
Communication Skill (22221101)

Day & Date: Monday, 20-11-2023 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 the correct alternative from the given options. **08**

1) Where did Gandhi meet his missionary friends?
   a) Orissa b) Vellore
   c) Madras d) Panji

2) What was the school attached to?
   a) Bus stand b) Hospital
   c) Temple d) Library

3) According to Rabindranath Tagore what is necessary to win freedom?
   a) Patience b) Friends
   c) Allies d) Wars

4) Who sang praises for the flowers?
   a) Bard b) Oracle
   c) Saints d) Birds

5) How does the father discover the son in his room?
   a) Sleeping b) Sobbing
   c) Playing d) Reading

6) What is the suitable prefix of the word – Legal?
   a) unlegal b) illegal
   c) inlegal d) delegal

7) What is the suitable suffix of the word – Manage?
   a) Manage b) Management
   c) ill manage d) Pre manage

8) Which of the following is used to join sentences, clauses and words?
   a) adverbs b) interjection
   c) conjunction d) verb

Q.2 Write the answer in short. (Any Four) **12**

a) What is the context of Gandhi's talk on religion?
b) What kind of relationship did the author have with his grandmother?
c) Discuss the poet's state of mind in the poem - Let Me Not Pray to be Sheltered from Danger.
d) Discuss the theme of the poem - The Lotus.
e) Define the ending of the poem - The Toys in your words.
f) What is the significance of the Sparrows in the lesson - The Portrait of a Lady'?

Q.3 Answer the following questions. (Any One) **10**

a) Define what is Communication and the process of Communication?

OR

b) Write in detail about the channels of Communication.

Q.4 Write a detail note on various intrapersonal skills? **10**

SLR-DA-2

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper - I)
Physical Chemistry (22221106)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) In adiabatic process, _____.
a) $q = 1$ b) $q = 0$
c) $q \neq 1$ d) $q = \infty$

2) Hydrolysis of methyl acetate in presence of acid is an example of _____ reaction.
a) pseudo-unimolecular b) bimolecular
c) unimolecular d) termolecular

3) Efficiency of heat engine is always equal to _____.
a) unity b) more than one
c) less than one d) zero

4) The Joule-Thomson effect is extensively used in _____.
a) warming of gas b) heating of gas
c) liquefaction of gas d) vaporizing the gas

5) In a graph, the straight line obtained is parallel to Y-axis. Then its slope is _____.
a) zero b) +1
c) -1 d) infinity

6) If $y = x^n,\ dy/dx =$ ____.
a) x^{n-1} b) $n\,x^{n-1}$
c) x^{n+1} d) $n\,x^{n+1}$

7) The process that occurs of its own accord is called as _____ process.
a) reversible b) non spontaneous
c) spontaneous d) all of these

8) $\int e^x\,dx =$ ____.
a) x b) $x + C$
c) $e^x + C$ d) C

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

a) Write van der Waals equation and give the significance of the terms involved in it.
b) Write the rate constant equation for second order reaction with initial concentrations of the reactants is unequal.
c) For a straight-line equation $y = -mx + C$, sketch the nature of the graph.

d) Define the terms
i) Order of a reaction ii) Molecularity of a reaction
e) Give the units for van der Waal's constant 'a' and 'b'
f) Define the term critical temperature.

Q.3 Write short notes on any two of the following. **08**
a) Joule-Thomson effect
b) Pseudo-unimolecular reaction
c) Rules of differentiation

Q.4 Answer any two of the following **08**
a) Derive the expression for the rate constant for first order reaction.
b) What is an isotherm? Discuss Andrew's isotherm for carbon dioxide gas.
c) What is a slope? Explain the characteristics of slope.

Q.5 Answer any one of the following **08**
a) Describe the characteristics of the second order reaction.
b) By using Carnot's cycle, derive the expression for efficiency of the process.

SLR-DA-3

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper - I)
Fundamental of Computer (22221120)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Short cut key is used to play slideshow in MS-Power point.
   a) F6 b) F8
   c) F9 d) F5

2) _____ is the volatile memory of computer.
   a) RAM b) ROM
   c) Both a and b d) None of the above

3) To save a new text file _____ short cut key is used.
   a) Ctrl + Z b) Ctrl + 0
   c) Ctrl + V d) Ctrl + S

4) The bar at the bottom of a window that holds no. of applications is known as?
   a) title bar b) status bar
   c) menu bar d) task bar

5) Magnetic tape is _____ storage device.
   a) Random b) Sequential Accessed
   c) Track d) None of these

6) UNIVAC is _____.
   a) Universal Automatic Computer
   b) Universal Array Computer
   c) Unique Automatic Computer
   d) Unvalued Automatic Computer

7) 1Gb is equal to _____.
   a) 1024 bytes b) 1024 Kb
   c) 1024 Mb d) 1024 Tb

8) Default extension of power point file is _____.
   a) .txt b) .pptx
   c) .docx d) all of these

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

a) Define Input Device.
b) Define system Software.
c) Define Hardware.
d) List out all input devices.
e) What is Mail-merge?
f) What is Pseudo code?

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

a) Algorithm
b) Primary memory
c) Flowcharts

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

a) Explain mouse and its types.
b) Explain different characteristics of computer.
c) Write any four excel functions with example.

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

a) Write the steps of mail merge.
b) Write the features of MS-Excel.

SLR-DA-4

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper - II)
Inorganic Chemistry (22221107)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Halogens have _____ electron affinity.
a) low b) medium
c) high d) zero

2) s-orbital has _____ shape.
a) dumb-bell b) square
c) spherical d) triangular

3) The co-ordination number of ion in CsCl is _____.
a) 8 b) 6
c) 4 d) 5

4) The crystal structure of NaCl is _____.
a) BCC b) FCC
c) cubic d) hexagonal

5) The geometry of water molecule is _____.
a) V shaped b) octahedral
c) linear d) hexagonal

6) The shape of PC15 molecule is _____.
a) linear b) octahedral
c) tetrahedral d) trigonal bipyramidal

7) The bond order of C2 molecule is _____.
a) one b) two
c) three d) four

8) The bond order of Li_2 molecule is ____.
a) 1 b) 2
c) 0 d) 1.5

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

a) What is Co-ordination number?
b) Give any two limitations of VBT.
c) Give the conditions for successful overlap of atomic orbitals.
d) State Hund's rule of maximum multiplicity.
e) What is Dipole-dipole interaction?
f) What is bonding molecular orbitals?

Q.3 Write Notes (Any Two) **08**

a) Induced-dipole Interaction
b) VSEPR theory
c) Shape of S-orbital

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

a) Explain the formation of PCl_5 molecule.
b) Discuss Born-Haber cycle for NaCl.
c) Write the calculation of radius ratio (r+ / r-) for ionic solid with octahedral geometry.

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

a) What is ionization energy? Discuss its trend in a period and in a group in the periodic table.

b) Describe the structure of CsCl with respect to unit cell, co-ordination number and stoichiometry.

SLR-DA-5

Seat No.	

Set P

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

Day & Date: Wednesday, 22-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) _____ function is user defined.
a) clrscr( ) b) printf( )
c) main( ) d) getch( )

2) _____ is the name given by the programmer.
a) Header file b) Identifier
c) Operator d) Both a & b

3) _____ is the result of statement 45<<3
a) 42 b) 48
c) 135 d) 360

4) What will be output of following C code?
printf("%d", printf("hello"));
a) hello5 b) 5hello
c) hello d) Compilation error

5) _____ are also called as reserved words.
a) Operator b) Variable
c) Keyword d) Special symbol

6) The range of float 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

7) _____ format code is used to read single float type value.
a) %g b) %d
c) %ld d) None of these

8) 'C' language developed by _____.
a) Ken Thompson b) Bill Gates
c) Stive Jobs d) Denis Ritchie

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

a) Define Union.
b) What is dynamic array?
c) What is datatype?
d) Define pointer.
e) How to declare structure?
f) How to access array elements?

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

a) Command line argument
b) Storage classes
c) Nested structure

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

a) Write a program for matrix multiplication.
b) What is call by value & call by reference? Explain with example.
c) Write a short note on random access of file.

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

a) How to open a file? Explain different file opening modes with example.
b) Write a program to copy the data of one file into another file.

SLR-DA-6

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - I)
Mechanics and Properties of Matter (22221104)

Day & Date: Thursday, 23-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Moment of Inertia of rotational motion is analogous to the _____ in translational Motion.
a) mass b) momentum
c) acceleration d) force

2) The angular acceleration of a compound pendulum is directly proportional to its _____.
a) mass b) moment of inertia
c) linear displacement d) angular displacement

3) If the energy of oscillating particle is continuously dissipated then the oscillations are called _____.
a) resonance b) damping
c) beats d) harmonics

4) _____ states that within elastic limit, stress is directly proportional to strain.
a) Elastic constant b) Poisson's ratio
c) Hooke's law d) Fugitive elasticity

5) If tangential force is applied to the top face of rubber cube by keeping base fixed the shear produced is 0.558 then the extension force is _____.
a) 0.279 b) 2.79
c) 0.0279 d) 2.79×10^{-3}

6) The angle of contact between glass and mercury is _____.
a) equal to 90° b) greater than 90°
c) less than 90° d) zero

7) The liquid drops of some liquid having radii in the ratio of 1:2 then the excess pressure inside these two liquid drops will be in the ratio of _____ respectively.
a) 1:4 b) 4:1
c) 1:2 d) 2:1

8) The profile of advancing liquid in the capillary tube is a _____.
a) hyperbola b) ellipse
c) parabola d) circle

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

a) Draw a labelled diagram of flywheel.

b) What do you mean by streamline flow and turbulent flow of liquid.

c) State any two applications of surface tension.

d) For iron $Y = 27 \times 10^{11}$ N/m^2 and $\eta = 12 \times 10^{11}$ n/m^2 Find the value of bulk modules (k) for the material.

e) Calculate equivalent length of simple pendulum of compound pendulum for minimum periodic time having the radius of gyration 20 cm.

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

a) Jaeger's method to determine surface tension of a liquid

b) Venturimeter

c) Tortional pendulum

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

a) Discuss the factors affecting to surface tension.

b) What is simple harmonic motion? Write the differential equation of SHM and give its solution?

c) Water flows at the rate of 50cc/sec through a horizontal capillary of length 50 cm and radius 0.1 cm. If the coefficient of water 0.012 poise. Calculate the pressure required to maintain the flow.

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 diameters.

b) Obtain the expression for work done during.

i) Longitudinal strain

ii) Volume strain

iii) Shearing strain per unit volume

SLR-DA-7

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper - I)
Introduction to Microbiology and Microbial Diversity (22221114)

Day & Date: Thursday, 23-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks**.**
4) Use of a 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) Who is known as the father of Microbiology?
a) Edwin John Butler b) Ferdinand Cohn
c) Robert Koch d) Antoni van Leeuwenhoek

2) Which of the following scientist tried to disprove Spontaneous generation theory by using simple goose-necked flasks?
a) Franz Schulze b) H. Schroder and T. Von Dusch
c) Louis Pasteur d) Theodor Schwann

3) Which of the following institution is devoted exclusively to HIV/AIDS research?
a) NCL b) CCMB
c) NARI d) NCCS

4) A virus is made up of _____.
a) Protein coat and nucleic acid
b) Protein coat and mitochondria
c) Nucleic acid and cell membrane
d) Nucleic acid, cell wall, and cell membrane

5) The size of the bacteria ranges from _____.
a) 0.2 to 5 μm b) 0.3 to 4 μm
c) 0.02 to 0.2 μm d) 0.2 to 0.4 μm

6) Under a microscope which organism would appear as a grape-like cluster of round cells?
a) *Vibrio* b) *Staphylococcus*
c) *Streptococcus* d) *Sarcina*

7) Methanogens belong to _____.
a) Eubacteria b) Dinoflagellates
c) Slime molds d) Archaebacteria

8) Which of the following gene deduced the evolutionary relationship between the taxonomic groups?
a) 16S rRNA b) 23S rRNA
c) 5S rRNA d) 18S rRNA

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

a) Enlist all branches of Microbiology.
b) Write the contributions of Robert Hook.
c) Definition of Bacteriophage
d) What is the full form of NCCS?
e) Enlist all National Institutes related to microbiology in India.

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

a) Theory of spontaneous generation.
b) Contribution of Martinus Beijerinck and Sergei Winogradsky.
c) General characteristics of Archaebacteria

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

a) Describe the bacterial identification by Morphological, and cultural characters.
b) Discuss the Viroids and Prions.
c) Explain the general characteristics of Algae and Protozoa.

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

a) Explain the differences between a prokaryotic and eukaryotic cell with a diagram.
b) Describe the general characteristics, occurrence, and economic importance of fungi.

SLR-DA-8

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper – II)
Optics (22221105)

Day & Date: Friday, 24-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) _____ are used in Newton's ring experiment.
a) Two Convex lenses b) 2 Concave lens
c) Plano convex & convex lens d) Plano convex & plane glass plate.

2) An achromatic combination of lenses is called as _____.
a) Achromatic double lens b) Achromatic doublet
c) Achromatic bi-lens d) Chromatic -lens

3) LASER radiations are highly _____ radiations.
a) Intense b) monochromatic
c) coherent d) all a, b & c

4) Ruby LASER is _____ LASER.
a) Gas b) Semiconductor
c) Solid State d) Liquid State

5) Wedge shaped film is an example of film with _____.
a) Varying thickness b) uniform thickness
c) zero thickness d) infinite thickness

6) The angle of Diffraction θ _____ with order of spectrum n.
a) Decreases b) increases
c) does not change d) tends to infinity

7) Resolving Power of Grating is _____ Resolving power of Prism.
a) Smaller than b) greater than
c) equal to d) infinite than

8) Chromatic aberration in lenses is due to _____.
a) Different wavelengths in incident light
b) focal length of lens
c) thickness of lens
d) color of lens

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

a) Define Spherical Aberration.
b) What do you mean by crossed lens?
c) Draw a neat labelled diagram of Ramsden's Eyepiece.
d) There are 17000 lines in an inch on a grating surface, calculate the grating element 'd'.
e) Give the long form of LASER.
f) What are the different applications of Spectrometer?

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

a) Write a note on Optical bench

b) Distinguish between Interference and Diffraction.

c) In a Newton's rings experiment the diameter of 16^{th} and 8^{th} dark rings were measured to be 0.8cm and 0.4cm respectively. If radius of curvature of plano-convex lens is 400cm, then calculate the wavelength of light used.

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

a) Compare Prism spectra & Grating spectra.

b) A convex lens has mean focal length of 60cm. Its material has R I for Violet color 1.69 and Red color 1.65. Calculate the Axial Chromatic Aberration.

c) Derive an expression for wavelength of diffracted light through Diffraction Grating.

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

a) Derive the equation for path difference in interference of reflected light through thin, parallel & uniform films.

b) Explain the construction and working of Ruby LASER.

c) Define Chromatic Aberration. Derive an expression for achromatism for two thin lenses in contact.

SLR-DA-9

Seat No.	

Set P

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

Day & Date: Fridays, 24-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Bacterial cell wall is made up of _____.
a) Chitin b) cellulose
c) peptidoglycan d) mannose

2) Teichoic acid is present in cell wall of _____.
a) Gram positive bacteria b) Gram negative bacteria
c) Mycoplasma d) All bacteria

3) The refractive index of air is _____.
a) 0.50 b) 0.75
c) 1.00 d) 1.25

4) Total magnification is obtained by _____.
a) Magnifying power of objective lens
b) Magnifying power of eyepiece
c) Magnifying power of condenser lens
d) Magnifying power of both objective lens and eyepiece

5) _____ is commonly used as a fixative agent in staining bacteria.
a) Heat b) Osmic acid
c) Glutaraldehyde d) Crystal violet

6) _____ is an example of acidic stain.
a) Crystal violet b) Methylene blue
c) Safranine d) Nigrosine

7) Temperature required for moist heat sterilization is _____.
a) 100^0 C b) 105^0 C
c) 110^0 C d) 121^0 C

8) Temperature required for dry heat sterilization is _____.
a) 100^0 C b) 115^0 C
c) 150^0 C d) 180^0 C

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

1) What is a Protoplast / Spheroplast?
2) What is the function of flagella?
3) Explain the concept of Resolving power?
4) Define stain and give 2 examples.
5) Define sterilization and disinfection.
6) Give long forms of SEM and TEM

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

a) Differentiate between Compound and Electron microscope.
b) What are types of stain?
c) Explain in detail mechanism of action of sterilization by U.V. rays and V. rays.

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

a) How copper and mercury are used for control of micro-organisms?
b) Discuss fluid mosaic model of cell membrane.
c) Draw neat diagram of image formation in compound microscope.

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

a) Discuss the structure of Gram Positive bacterial cell wall.
b) Give detailed procedure of Gram staining.

SLR-DA-10

Seat No.	

Set P

B.Sc. (Semester – I) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - I)
Descriptive Statistics - I (22221108)

Day & Date: Saturday, 25-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Data taken from the Reserve Bank of India Bulletin will be considered as _____.
   a) Primary data b) Secondary data
   c) Both (A) and (B) d) None of these

2) With the help of histogram, one can determine _____.
   a) Mean b) Median
   c) Mode d) Quartiles

3) With the three attributes A, B and C, the number of first order classes is _____.
   a) 6 b) 9
   c) 12 d) None of the above

4) The arithmetic mean of first n natural number is _____.
   a) $\frac{n(n+1)}{2}$ b) $\frac{n+1}{n}$
   c) $\frac{n}{2}$ d) $\frac{n+1}{2}$

5) The number of partition values in case of quartiles are _____.
   a) 4 b) 3
   c) 2 d) 1

6) The measure of dispersion which uses only two observations is called _____.
   a) Quartile deviation b) Mean deviation
   c) Range d) Standard deviation

7) 'Square root of mean square deviation from mean' is _____.
   a) S.D. b) Q.D.
   c) M.D. d) None of these

8) Bowley's coefficient of skewness lies between _____.
   a) 0 and 1 b) -1 and $+1$
   c) -1 and 0 d) -2 and $+2$

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

a) Define Variable and Constant.
b) Find mode of the following data 2, 4, 6, 3, 2, 4, 5, 7, 4, 6, 6, 4, 5.
c) Define mean square deviation.
d) Define fundamental sets of class frequencies.
e) Prove that first central moment is zero.

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

a) Explain the construction of histogram.

b) What is the effect of change of origin and scale on arithmetic mean?

c) Write a note on Sheppard's correction.

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

a) State and prove minimal property of mean square deviation.

b) Prove that sum of deviation taken from mean is zero.

c) Explain the term association and disassociation with examples.

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.

SLR-DA-11

Seat No.	

Set P

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

Day & Date: Saturday, 25-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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) _____ system is characteristic of Poriferans.
   a) Siphon b) Canal
   c) Fission d) Budding

2) Earthworm belongs to class _____.
   a) hirudinae b) polychaeta
   c) multichaeta d) oligochaeta

3) Sexual reproduction in protozoa is by _____.
   a) Binary fission b) Multiple Fission
   c) Conjugation d) Cyst formation

4) Insects belongs to phylum _____.
   a) Annelida b) Arthropoda
   c) Porifera d) Mollusca

5) Water vascular system is a characteristic feature of _____.
   a) Echinodermata Annelida b) Arthropoda
   c) Porifera d) Mollusca

6) The number of segments in leech is _____.
   a) 33 b) 32
   c) 31 d) 30

7) A Hydra can suddenly project in self defence from its tentacles by _____.
   a) epithelial cell b) nematocyst
   c) cnidocyst d) nematoepithelial cell

8) Octopus belongs to the class _____.
   a) Bivalvia b) Gastropoda
   c) Cephalopoda d) Decapoda

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

a) Holozoic nutrition in protozoa
b) General characters of phylum Annelida
c) Tribloblastic
d) Pesudocoelom
e) Kingdom Protista

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

a) Polymorphism in hydrozoa
b) Parasitic adaptations of tapeworm
c) General characters of mollusca

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

a) Water vascular system in asteroidea
b) Economic importance of annelids
c) Classification up to classes of coelenterate with examples

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

a) General characters of phylum Arthropoda and give economic importance of insects.
b) Describe life cycle of *Ascaris lumbricoides*. Add a note on its parasitic adaptation.

SLR-DA-12

Seat No.	

Set P

B.Sc. (Semester – I) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper – II)
Elementary Probability Theory (22221109)

Day & Date: Sunday, 26-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Relative complement of B w. r. t. A is given by _____.
   a) $A \cap B^c$ b) $A^c \cap B$
   c) $A^c \cup B$ d) None of the above

2) If discrete sample space contains 5 elements then total number of events on this sample space is _____.
   a) 10 b) 5
   c) 32 d) 25

3) A number is selected at random from first 50 natural numbers. Then the probability that it is a multiple of 3 and 4 is: _____.
   a) 7/50 b) 4/25
   c) 1/25 d) 2/25

4) Probability of an event is always less than or equal to _____.
   a) 1 b) 0
   c) 0.5 d) None of the above

5) If A^c is the complementary event of A, then $P(A^c)$ is _____.
   a) 1 b) 0
   c) $P(A)$ d) $1 - P(A)$

6) If A and B are two events, the probability of occurrence of either A or B is ____.
   a) $P(A) + P(B)$ b) $P(A \cup B)$
   c) $P(A \cap B)$ d) $P(A).P(B)$

7) If A and B are independent events with $P(A) = \frac{1}{2}, P(B) = \frac{1}{3}$, then $P(A \cap B) =$ _____.
   a) $\frac{2}{3}$ b) 1
   c) $\frac{1}{6}$ d) None of these

8) In Bayes' theorem the events $A_1, A_2, A_3, \ldots\ldots A_n$ are _____.
   a) independent
   b) equally likely
   c) mutually exclusive and exhaustive
   d) none of these

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

a) Define Random experiment.
b) Define elementary event and composite event.
c) Define mathematical definition of probability.
d) Define independent events.
e) Let A and B are independent events such that $P(A) = 0.2, P(A \cup B) = 0.5$. Then find $P(B)$

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

a) If A, B, C are three events. Express the following events in appropriate symbols.
1) Simultaneous occurrence of events A, B, C
2) Occurrence of at least one of the events A, B, and C
3) A, B and C are mutually exclusive
4) Every point in A is contained in B

b) A and B are two events defined on sample space Ω such that $P(A) = \frac{1}{4}, P(B) = \frac{1}{5}, P(A \cap B) = \frac{1}{7}$, Find
1) $P(\bar{A} \cup \bar{B})$
2) $P(A \cap \bar{B})$

c) If A and B are two events and $P(A) \neq 1$. Prove that,

$$P\left(B/\bar{A}\right) = \frac{P(B) - P(A \cap B)}{1 - P(A)}$$

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

a) Two dice one is red and other is green are thrown. Let A be the event that the sum of points on the faces shown is even and B be the events that at least one is ace number. Obtain,
1) The sample space
2) Events A and B

b) If a coin and a dice are tossed together, find
1) Sample Space
2) Probability of head on coin and even number on dice

c) If $\boldsymbol{P(A) = 0.50, P(B) = 0.60, P\left(B/A\right) = 0.90}$, Find the probability that,
1) A and B both happens
2) A happens given that B has happened

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

a) Prove that for any two events A and B
$\boldsymbol{P(A \cap B) \leq P(A) \leq P(A \cup B) \leq P(A) + P(B)}$

b) State and prove Baye' s theorem on probability.

SLR-DA-13

Seat No.	

Set P

B.Sc. (Semester – I) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper – II)
Animal Diversity – II (22221123)

Day & Date: Sunday, 26-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Acraniata means absence of _____.
   a) Brain b) Heart
   c) Lung d) Kidney

2) Phylogeny is study of _____.
   a) Excretion b) Reproduction
   c) Circulation d) Evolution

3) Petromyzon consist of _____ Pairs of branchial aperture.
   a) 5 b) 6
   c) 7 d) 8

4) Cartilaginous fishes are included in order
   a) Chondrichthyes b) Osteichthyes
   c) both a and b d) none of these

5) Order anura is due to absence of _____.
   a) Trunk b) Head
   c) Neck d) Tail

6) Squmata includes _____.
   a) Only lizard b) Lizard & snake
   c) Only snake d) Crocodiles

7) The non-poisonous snake among the following.
   a) Cobra b) Krait
   c) Python d) Viper

8) The bones of birds are _____.
   a) Strong & solid b) Pneumatic and light
   c) Soft & solid d) Calcareous & heavy

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

a) Myxine
b) Fins in fishes
c) Apoda
d) Treatment of Snake bite
e) Rodentia
f) Agnatha

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

a) General character of Pisces.
b) General characters of amphibian.
c) Economic importance of fishes.

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

a) General features of class aves.
b) Describe venomous snake.
c) Explain flight adaptation in birds.

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

a) Describe general features of class-Mammalia.
b) Explain general characters of reptiles.

SLR-DA-14

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - I)
Algebra (22221116)

Day & Date: Tuesday, 28-11-2023 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 the correct alternatives each of the following. **08**

1) The characteristic equation of the matrix $\begin{bmatrix}1 & 2\\3 & 2\end{bmatrix}$ is _____.

a) $x^2 - 3x - 4 = 0$ b) $x^2 - 3x + 8 = 0$
c) $x^2 - 2x - 4 = 0$ d) $x^2 + 3x + 4 = 0$

2) A square matrix $A = [a_{ij}]$ is skew-symmetric iff _____.

a) $a_{ij} = -a_{ji}$ for all i & j b) $a_{ij} = -a_{ji}$ for some i & j
c) $a_{ij} = -a_{ji}$ for $i \neq j$ d) $a_{ij} = a_{ji}$ for $i \neq j$

3) The correct set of eigen value of matrix $\begin{bmatrix}2 & 3 & 5\\0 & 3 & 5\\0 & 0 & 4\end{bmatrix}$ is _____.

a) $2, 3, 5$ b) $2, 3, 4$
c) $3, 4, 5$ d) $0, 3, 5$

4) If $\rho(A) \neq \rho(A:B)$ then the system $AX = B$ is _____.

a) consistent b) inconsistence
c) homogeneous d) possess a solution

5) $|4 - 3i| =$ _____.

a) 5 b) 4
c) 3 d) 2

6) If G is a group then for all $a, b \in G$, _____.

a) $(ab)^{-1} = a^{-1}b^{-1}$ b) $(ab)^{-1} = ab$
c) $(ab)^{-1} = (ba)^{-1}$ d) $(ab)^{-1} = b^{-1}a^{-1}$

7) $\cosh^{-1}(z)$ = _____.

a) $\log(z + \sqrt{z^2 + 1})$ b) $\log(z - \sqrt{z^2 - 1})$
c) $\log(z + \sqrt{z^2 - 1})$ d) $\log(z - \sqrt{z^2 + 1})$

8) If e_1 and e_2 are two identify elements in a group G then _____.

a) e_1 and e_2 are distinct b) $e_1 = ke_2$
c) $e_1 = e_2$ d) $e_1 + e_2 = 0$

Q.2 Attempt Any Four of the following. **08**

a) Verify Cayley - Hamilton theorem for the matrix.
$A = \begin{bmatrix} 1 & 2 \\ -1 & 3 \end{bmatrix}$

b) Solve
$x + 2y + 3z = 0; 3x + 4y + 4z = 0; 7x + 10y + 12z = 0$

c) Separate into real and imaginary part of i^i

d) Prove that $\cosh^2 z - \sinh^2 z = 1$

e) Define Group.

f) Find all values of $(-1)^{1/3}$

Q.3 Attempt Any Two of the following. **08**

a) Find the rank of the matrix.
$$\begin{bmatrix} 1 & 2 & 3 & 2 \\ 3 & 1 & 1 & 3 \\ 0 & 1 & 2 & 1 \end{bmatrix}$$

b) Prove that $\cosh\theta = \cos^4\theta - 6\cos^2\theta\sin^2\theta + \sin^4\theta$

c) If x is real then prove that
$\cosh^{-1} x = \log\left(x + \sqrt{x^2 - 1}\right)$

Q.4 Attempt Any Two of the following. **08**

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

b) In any group prove that
i) Identity element is unique
ii) Inverse of each element $a \in G$ is unique

c) For all value of z real or complex prove that
i) $e^{iz} = \cos z + i\sin z$
ii) $\cos z = \dfrac{e^{iz} + e^{-iz}}{2}$

Q.5 Attempt Any One of the following questions. **08**

a) State and prove Cayley-Hamilton theorem.
Find the characteristic equation of $A = \begin{bmatrix} 3 & 1 \\ -1 & 2 \end{bmatrix}$

b) State and prove De-Moivre's theorem.

SLR-DA-15

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper - I)
Microbiology and Phycology (22221102)

Day & Date: Tuesday, 28-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple Choice Question **08**

1) In Virus, genetic material protected by a protein coat is called _____.
a) Virion b) Peplomers
c) Capsid d) Capsomere

2) Bacillus bacteria are _____ shaped.
a) circular b) comma
c) spiral d) rod

3) Ribbon shaped chloroplast found in _____.
a) *Spirogyra* b) *Nostoc*
c) *Sargassum* d) *Vaucheria*

4) *Nostoc* is example of _____.
a) red algae b) blue green algae
c) brown algae d) green algae

5) Mycoplasma is _____.
a) eukaryotic and unicellular b) prokaryotic and unicellular
c) prokaryotic and multicellular d) eukaryotic and multicellular

6) *Vaucheria* reproduce by _____ method.
a) only vegetative b) only asexual
c) only sexual d) vegetative, sexual and asexual

7) Viruses that attack bacteria are called _____.
a) virophage b) lysophage
c) bacteriophage d) None of above

8) The alga that is exploited as a rich source of protein is _____.
a) *Spirogyra* b) *Sargassum*
c) *Spirulina* d) *Nostoc*

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

a) Draw neat labeled diagram of tobacco mosaic virus.
b) What is phycology?
c) Write the classification of *Spirogyra* as per G.M. Smith.
d) What is mean by transduction?
e) Write the significance of blue green algae.
f) What is transformation?

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

a) Heterocyst of *Nostoc.*
b) Asexual reproduction in *Vaucheria.*
c) General character of Mycoplasma.

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

a) Write the general characters of Viruses.
b) Describe the thallus structure in *Sargassum.*
c) Write the economic importance of algae.

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

a) Describe the bacterial cell structure with labeled diagram.
b) What is mean by conjugation? Explain in brief conjugation in *Spirogyra.*

SLR-DA-16

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - II)
Calculus (22221117)

Day & Date: Wednesday, 29-11-2023 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 Select the correct alternatives each of the following. **08**

1) If $y = (ax + b)^m$ then $y_n =$ _____.

a) $y_n = 0$ b) $y_n = m!\,(ax + b)^{m-n}$

c) $y_n = \dfrac{m!\,a^n}{(m-n)!}(ax + b)^{m-n}$ d) $y_n = 1$

2) $\lim\limits_{x\to 0}[x.\log x] =$ _____.

a) 0 b) 1

c) 2 d) ∞

3) Number of Independent variables in partial differentiation should be _____.

a) 0 b) 1

c) -1 d) at least two

4) For the function of two variables domain is subset of _____.

a) R b) R^2

c) R^3 d) R^n

5) $\int\limits_0^1 x^2(1-x^2)^{7/2}\,dx =$ _____.

a) $\dfrac{63\pi}{512}$ b) $\dfrac{7\pi}{256}$

c) $\dfrac{63\pi}{256}$ d) $\dfrac{7\pi}{512}$

6) $\int\limits_0^{\pi/4} \sin^7(2\theta)d\theta =$ _____.

a) $\dfrac{16}{35}$ b) $\dfrac{8}{35}$

c) $\dfrac{8}{105}$ d) $\dfrac{16}{105}$

7) If ϕ is a constant then $\nabla\phi =$ _____.

a) 0 b) 1

c) -1 d) $i + j + k$

8) Curl $(grad\ \phi) =$ _____.

a) 1 b) $\nabla\phi$

c) 0 d) $i + j + k$

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

a) Write any four indeterminates forms.

b) If $y = a^{mx}$ then find y_n

c) Explain limit of function of two variables.

d) Evaluate $\int_0^{\pi/2} \sin^{10} x.\, dx$

e) Define gradient.

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

a) Define Divergence and Curl.

b) Evaluate $\int_0^{2\pi} \sin^4 x \,.\cos^2 x \,.\, dx$

c) Show that $\lim_{x\to 0} \left[\frac{\tan x}{x}\right]^{1/x} = 1$

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

a) If $y = e^{ax}.\sin(bx + c)$ then find y_n

b) Evaluate $\int_0^2 (4 - x^2)^{7/2} \,.\, dx$

c) State and prove Euler's theorem on Homogeneous function.

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

a) State and prove the Leibnitz's theorem.

b) Prove that $\nabla^2 \left(\frac{1}{r}\right) = 0$

SLR-DA-17

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper – II)
Fungi and Archegoniate (22221103)

Day & Date: Wednesday, 29-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: (Instructions may differs for subject to subject)

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

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

1) Majority of fungi prefers to grow in _____ in moist habit.
a) Darkness b) dim light
c) UV light d) Both a) & b)

2) *Albugo* causes the disease which is called as _____.
a) red rust b) yellow rust
c) white rust d) black rust

3) The Ascomycetes are commonly called as _____.
a) bag fungi b) sac fungi
c) black molds d) rust

4) The division Myxomycota is divided into _____ classes.
a) three b) four
c) two d) five

5) _____ plants are non-vascular cryptogams.
a) Bryophyte b) Pteridophyte
c) Gymnosperm d) Angiosperm

6) Foot and Seta are absent in _____ sporophyte.
a) *Riccia* b) *Anthoceros*
c) *Marchantia* d) None of these

7) Presence of _____ is the unique feature of *Selaginella* stem.
a) Epidermis b) Trabacule
c) Xylem d) Phloem

8) Presence of transfusion tissue is characteristic of *Cycas* _____.
a) Leaflet b) Stem
c) Root d) All of these

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

a) What is mycelium?
b) Define mycology.
c) What is the occurrence of *Mucor?*
d) Define Pteridophyta.
e) Classify *Cycas* with reasons.
f) Define fungi.

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

a) Thallus organization in *Agaricus*
b) The medicinal importance of Bryophytes.
c) T.S. of *Cycas* leaflet

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

a) Describe general characters of fungi.
b) Describe with neat, labelled diagram T. S. of *Selaginella* stem.
c) Explain the morphology of *Cycas* sporophyte.

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

a) Describe in brief with respect to occurrence, thallus organization and asexual method of reproduction in *Mucor*
b) What is alternation of generation? Give outline of life cycle in *Selaginella!*

SLR-DA-18

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper - I)
Basic Circuit Theory and Network Analysis (22221118)

Day & Date: Thursday, 30-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) _____ is used as an electromechanical switch.
a) Capacitor b) Relay
c) Fuse d) Transformer

2) In a pure resistive circuit, the voltage and current are _____ with each other.
a) In Phase b) Out of Phase
c) Leading d) Lagging

3) Series resonance circuit is also called a _____ circuit.
a) Rejecter b) Current Magnifier
c) Voltage Magnifier d) None of these

4) Thevenin's equivalent resistance (R_{TH}) is found by _____.
a) Short the output terminals.
b) Replacing the voltage sources with their internal resistances
c) Replacing the current sources with their internal resistance
d) Both (b) and (c)

5) The Z parameters are called _____ parameters.
a) Admittance b) ABCD
c) Hybrid d) Impedance

6) The colour code for a 1.2 K$\Omega \pm$ 10 % resistor is _____.
a) Brown, Black, Red and Sliver b) Brown, Red, Orange and Sliver
c) Brown, Red, Red and Sliver d) Brown, Red, Black and Sliver

7) A sinusoidal AC current has an RMS value of 50 amps; its maximum value is _____.
a) 78.61 amps b) 70.72 amps
c) 25 amps d) 100 amps

8) The hybrid parameter h_{22} is called _____.
a) Output Conductance b) Reverse voltage gain
c) Input impedance d) Forward current gain

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

a) What is capacitance? State its unit.
b) A series resonance circuit has a bandwidth of 40 KHz and a quality factor of 5. Calculate the resonating frequency.
c) Define the term “In Phase” and “Out of Phase”.
d) State Maximum Power Transfer Theorem.
e) Enlist hybrid parameters with their units.
f) State Superposition Theorem.

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

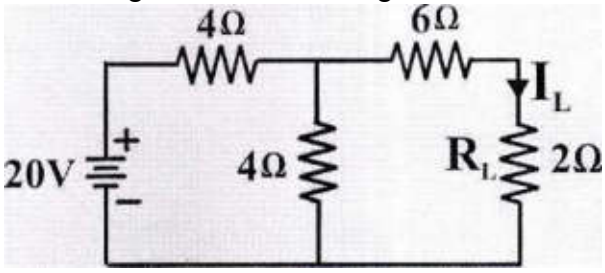
a) Phase relationship between current and voltage in pure capacitive circuit.
b) Series resonance circuit.
c) Non-sinusoidal sources

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

a) What is resistance? State its unit. Give the classification of resistors.
b) A series LCR circuit has an inductor of 150 mH, capacitor of 1000 μf and resistance of 100Ω is operated with 230 V, 50 Hz AC supply. Calculate the inductive and capacitive reactance.
c) Compare series and parallel resonance circuit.

Q.5 Answer Any One: **08**

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



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

SLR-DA-20

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper - I)
Geomorphology - I (22221124)

Day & Date: Thursday, 30-11-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The term geomorphology derived from _____ word.
a) Spanish b) Arabic
c) Roman d) Greek

2) Geomorphology is the branch of _____ geography.
a) Physical b) Economic
c) Social d) Human

3) The evolution of the surface features of the earth is studied in _____.
a) Climatology b) Geomorphology
c) Pedology d) Hydrology

4) The average density of the Mantle is _____.
a) 3.3 to 5.5 gm/cm^3 b) 6.0 to 6.5 gm/cm^3
c) 2.9 to 3.3 gm/cm^3 d) 3.3 to 4.5 gm/cm^3

5) Nearly _____ percent of the earthquake of the world originate in Mediterranean belt.
a) 12 b) 22
c) 32 d) 42

6) Strombolian volcano is located on_____ island.
a) Lipari b) Hawalian
c) Anandman and Nicobar d) None of these

7) The term Plate was first used by _____.
a) Humbolt b) Ritter
c) Wilson d) Morgan

8) _____ waves pass through liquid and solid medium also.
a) Primary b) Secondary
c) Surface d) None of these

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

a) What is Geomorphology?
b) What is Primary Rock?
c) What is Faulting?
d) What is Earthquake?
e) What is Secondary Wave?
f) What is SIMA?

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

a) Importance of Geomorphology
b) Characteristics of Igneous Rock
c) Normal Fault

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

a) Explain the causes of plate motion.
b) Explain the Interior Structure of the Earth.
c) Explain the Types of Folding.

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

a) Explain the nature of Geomorphology.
b) Explain the destructive effect of Earthquake.

SLR-DA-21

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper - I)
Physical Geology (22221110)

Day & Date: Thursday, 30-11-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) The inner and outer planets are separated by _____.
a) Minor planets b) Giant planets
c) Terrestrial belt d) Asteroid belt

2) Average radius of planet earth is _____ Km.
a) 6471 b) 6871
c) 6371 d) 7371

3) The density of outer planets is near about _____.
a) Low b) very high
c) High d) None of these

4) The Nebular hypothesis put forward by _____.
a) Chamberlin b) Kant
c) Kant and Lapels d) Chamberlin and Moulton

5) Propagation of P-wave is similar to _____ wave.
a) Seismic b) Sound
c) Light d) None of these

6) The second most abundant gas relies from volcano is _____.
a) CO_2 b) Water vapor
c) Sulfer d) None of these

7) Low velocity layer is also called _____.
a) lithosphere b) Mesosphere
c) Asthenosphere d) None of these

8) Formation of soil depends upon _____ factor.
a) parent material b) Time
c) Climate and land forms d) All of these

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

a) Major planets
b) Size and shape of Earth
c) Isoseismal lines
d) Regolith
e) Conrad discontinuity

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

a) Describe nebular hypothesis.
b) Describe Sesmic waves.
c) Describe products of volcano.

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

a) Describe Atmosphere.
b) Describe the fissure and central type of volcano.
c) Describe Seismogram and seismograph.

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

a) Describe types of weathering in details.
b) Explain internal structure of the earth.

SLR-DA-22

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper - II)
Digital Fundamentals (22221119)

Day & Date: Friday, 01-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Group of 8 bits is known as _____.
a) double word b) byte
c) quad d) word

2) The Gray Code for binary data $(1111)_2$ is _____.
a) 1001 b) 1010
c) 1000 d) None of these

3) _____ IC is a Quad two input EX-OR gate.
a) 7400 b) 7402
c) 7432 d) 7486

4) In Boolean algebra A+AB+AC = _____.
a) A + AB b) A + AC
c) A d) 1

5) _____ gate is used as a MOD-2 adder
a) X-OR b) AND
c) OR d) X-NOR

6) 2's complement of binary no $(00000)_2$ is _____.
a) 011111 b) 100000
c) 000001 d) 111111

7) The full form of ASCII code is _____.
a) American Standard Code for Internet Interchange
b) American Standard Code for Internet Interconnect
c) American Standard Code for Information Interconnect
d) American Standard Code for Information Interchange

8) In the 4 variable K map, the group of 8 adjacent cellsyields _____ variable product term.
a) one b) two
c) three d) four

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

a) State the radix of the
- i) Decimal
- ii) Octal
- iii) Binary
- iv) Hexadecimal no. system.

b) State the application of the XOR gate.

c) Draw the symbol of three inputs AND gate& state its truth table.

d) Show that (A+B) (A+C) = A+BC

e) Draw apin diagram of IC 7408.

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

a) Perform the BCD addition
- i) (96) + (38)
- ii) (87) + (49)

b) Perform the subtraction $(1101)_2 - (1010)_2$ by using 1's & 2's complement method.

c) Reduce logic equation $Y = \bar{A}\,\bar{B}\,C + \bar{A}\,B\,\bar{C} + A\,\bar{B}\,\bar{C} + A\,B\,C$ using Boolean algebra and realizing by using gates.

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

a) State and prove De-Morgan's theorems.

b) By using the K map reduce the logic equation
$Y = \bar{A}\,\bar{B}\,C\,D + \bar{A}\,\bar{B}\,C\,\bar{D} + \bar{A}\,B\,\bar{C}\,\bar{D} + \bar{A}\,B\,\bar{C}\,D + \bar{A}\,B\,C\,D + \bar{A}\,B\,C\,\bar{D} + A\,B\,\bar{C}\,\bar{D} + A\,B\,\bar{C}\,D + A\,B\,C\,D + A\,B\,C\,\bar{D} + A\,\bar{B}\,\bar{C}\,D$

c) Explain full adder circuit.

Q.5 Answer any one: **08**

a) Why NOR / NAND gate is called a universal gate? Give the construct of basic gates by using NOR and NAND gates only.

b) Explain four-bit binary parallel Adder/Subtractor by using EX-OR gate.

SLR-DA-24

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper – II)
Geomorphology - II (22221125)

Day & Date: Friday, 01-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Write the correct option in the blanks. **08**

1) _____ is the process of disintegration and decomposition of rocks on the earth surface.
a) Weathering b) Erosion
c) Debris d) Soil creep

2) V- shaped valley are formed by the_____ work of the river.
a) Depositional b) Erosional
c) Transportation d) None of these

3) The moving ice mass down slope under the impact at gravity is called _____.
a) Wind b) Glacier
c) River d) Underground water

4) Wave cut platform is formed due to the _____ work of sea water.
a) Depositional b) Erosional
c) Transportation d) Weathering

5) _____ is formed due to the Erosional work of wind.
a) Mushroom rock b) Waterfall
c) Delta d) Fiord

6) _____ landform is formed due to depositional work of wind.
a) Loess b) Mushroom rock
c) Pains d) Waterfall

7) _____ type of mass movement occurs on precipitous to vertical slope?
a) Creep b) rapid flowage
c) sliding d) toppling

8) _____ is not an agent of Biological weathering.
a) Animal b) Human
c) Plant d) Oxygen

Q.2 Write Short Answer. (Any Four) **08**

a) Define the weathering process.
b) What are the Biotic weathering agents?
c) State the name of erosional landforms of river.
d) Define the mass wasting.
e) State the name of depositional landforms associated with Aeolian.

Q.3 Write Short Notes (Any Two) **08**

a) Depositional work of Fluvial
b) Erosional work of coastal
c) Chemical weathering

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

a) Describe the erosional land form associated with glacial.
b) Discuss the concept of W.M. Davis's cycle of erosion in brief.
c) Describe the types of mass wasting in brief.

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

a) Describe the landforms associated with erosional work of Aeolian.
b) State the types of weathering and describe the physical weathering.

SLR-DA-25

Seat No.	

Set P

B.Sc. (Semester - I) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper – II)
PALAEONTOLOGY (22221111)

Day & Date: Friday, 01-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Which of the following is NOT a mode of Preservation of fossils?
   a) Petrification b) Imprints
   c) Mould & Casts d) Petrography

2) All the whorls on the shell of gastropod except body whorls form _____.
   a) Columella b) Spire
   c) Thorax d) Hinge

3) Pecten belongs to _____ class.
   a) Lamellibranch b) Cephalopoda
   c) Gastropod d) Anthozoa

4) Nautilus and Goniatites belongs to ____ class.
   a) Lamellibranch b) Cephalopoda
   c) Gastropod d) Anthozoa

5) In _____ the exo-skeleton is coiled in nature.
   a) Sponge b) Trilobites
   c) Coral d) Cephalopod

6) In _____ process, organic material is converted to inorganic by molecule by molecule replacement.
   a) Petrification
   b) Petrology
   c) Tracks & trails
   d) Entire organism preservation

7) Paradoxides, Ogygia and Trinucleus are species belong to phylum _____.
   a) Arthropoda b) Echinodermata
   c) coelenterate d) Brachiopod

8) Which of the following represent flora of Gondwana system?
   a) Glossopteris b) Gangamopteris
   c) Ptillophyllum d) All the above

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

1) Define Paleontology.
2) Draw labelled diagram showing hard parts of Lamellibranch.
3) What is Hinge line in Lamellibranch shells?
4) Give any two names of species belong to phylum Echinodermata.
5) Give any two names of species belong to class Gastropods.

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

1) Imprint
2) Evolution of Horse
3) Conditions of fossilization

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

1) Explain types of sutures on cephalopod shell.
2) Explain Corona in Echinoid shell.
3) Describe Mould and Casts.

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

1) Define Fossils. Describe any three significances of fossils in Geology.
2) Define Fossils. Explain morphology of hard parts of Trilobite.

SLR-DA-26

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
COMPULSORY ENGLISH
Communication Skill (22221201)

Day & Date: Saturday, 02-12-2023 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 the correct alternative from the given options. **08**

1) A talk must be intermingled with a quantity of _____.
a) anger b) jest
c) tears d) boredom

2) Traditional education kills the very _____ of the budding learners.
a) initiative b) initials
c) intimations d) insecurity

3) To Tagore, "The civilization of the West has in it the spirit of the _____.
a) alcohol b) machine
c) nature d) heaven

4) Niyi Osundare's "Our Earth Will Not Die" breathes a _____ attitude.
a) positive b) negative
c) no d) null

5) Alexander Pope considers simplicity and _____ to be assets of a successful life.
a) indulgence b) crowd
c) loneliness d) greediness

6) 'Gone far away into the silent land'. In this line 'the silent land' symbolizes _____.
a) life b) death
c) earth d) dream

7) They admit their crime. The antonym for 'admit' in this sentence is _____.
a) accept b) own
c) deny d) confess

8) The letter is _____ written by his elder brother.
a) being b) been
c) was d) be

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

a) Why did Francis Bacon give more importance to discretion than eloquence?
b) What was Bertrand Russell's experience with the squirrels?
c) How did Rabindranath Tagore assess the society of America?
d) Describe the central theme of Niyi Osundare's "Our Earth Will Not Die".
e) Bring out the farmer's life as seen in Alexander Pope's "Ode on Solitude".
f) What would happen if the partner of Christina Rossetti became sad after remembering her?

Q.3 Answer the following questions. (Any One) **10**

a) Write a letter of complaint to Sony TV Shop in Solapur about a television set you bought recently and was not functioning well. Address your letter to the Manager of the Shop.

OR

b) Write a letter inviting a famous local writer to attend the Annual Prize Distribution Function to be held in your college.

Q.4 Write an elaborate note on the interpersonal intelligence and its significance. **10**

SLR-DA-27

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper - III)
Organic Chemistry (22221208)

Day & Date: Sunday, 03-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Choose the most correct alternative for the following and rewrite the sentence. **08**

1) Which of the following is a electrophile?
a) BF_3 b) H_2O
c) CH_3OH d) NH_3

2) Mesotartaric acid is _____.
a) Geometrical isomer b) Optically inactive
c) Optically active d) Racemic mixture

3) Which of the following is the general formula of cycloalkane?
a) $C_nH_2n + 2$ b) $C_nH_2n - 2$
c) C_nH_2n d) None of these

4) Aromaticity is explained by the rule _____.
a) Hunds rule b) Phase rule
c) Huckels rule d) None of these

5) Which of the following is chiral molecule?
a) $CHBr_3$ b) $CHClBr$
c) CH_3Cl d) CH_2Cl_2

6) In benzene all carbon atoms are in _____ hybridized state.
a) $sp3$ b) sp
c) sp^3d d) sp^2

7) Baeyer's reagent is _____.
a) acidic $KMnO_4$ b) alk. $KMnO_4$
c) neutral $KMnO_4$ d) all of the above

8) 1, 4-Pentadiene is an example of _____.
a) isolated diene b) conjugated diene
c) cumulated diene d) None of these

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

a) What is Heterolytic fission? Give one example.
b) Draw the resonating structures of phenol.
c) What is Enantiomers? Give one example.
d) What is the meaning of curved arrow and half headed arrow?
e) What are the conditions for aromaticity?
f) Write the structures of the following.
1) Methyl cyclohexane
2) Cyclobutane

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

a) Friedel-Crafts acylation
b) Hybridization
c) Carbocation and Carbanion

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

a) Define and explain Resonance effect with respect to Phenol.
b) Write a note on addition reactions.
c) State Huckels rule. Explain aromaticity of Pyrrole by applying Huckels rule to it.

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

a) What are dienes? Describe different types of dienes with suitable examples. Discuss any two methods of preparation of 1, 3- butadiene.
b) What is optical activity? Discuss the optical isomerism of Lactic acid and 2,3- dihydroxybutanoic acid.

SLR-DA-28

Seat No.	

Set P

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

Day & Date: Sunday, 03-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Which property is used to change the background color in CSS?
a) bgcolor: b) background-color:
c) color: d) none of these

2) JavaScript is not case sensitive language.
a) True b) False

3) What is the correct syntax of CSS?
a) selector { property: value } b) selector { property= value }
c) selector (property; value) d) selector (property, value)

4) Id attribute is followed by _____ sign.
a) @ b) &
c) # d) .

5) How can you make a bulleted list?
a) <list> b)
c) <nl> d)

6) Which of the following element is responsible for making the text italic in HTML?
a) <i> b) <italic>
c) <it> d) <pre>

7) Which of the following CSS property sets the font size of text?
a) font-size b) text-size
c) text d) size

8) Who is inventor of HTML?
a) Tim Burners Lee b) Sir Thomas
c) Charles Babbage d) none of these

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

a) Explain string function in JavaScript.
b) What is element selector?
c) What is hyperlink?
d) Define opacity.
e) What is Image floating?

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

a) Animation in CSS
b) Image Tag
c) Frameset tag in HTML

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

a) Explain form tag and use different input types with example.
b) Explain basic structure of HTML document.
c) Explain different types of CSS selectors.

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

a) What are the types of CSS? Explain types with example.
b) Write a program in JavaScript to find given number is Armstrong or not.

SLR-DA-29

Seat No.	

Set P

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

Day & Date: Monday, 04-12-2023 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.
4) Drow neat labelled diagram whatever.
3) Use of log table or calculator is allowed.
4) Atomic weight of H=1, C=12, 0=12, 0=16, S=32, N=14, Ba=137, Ag=108

Q.1 Select most correct alternative among the following & rewrite the sentences. 08

1) _____ having zero dipole moment.
a) CO_2 b) H_2O
c) HF d) HCl

2) Molecular weight is _____ property.
a) constitutive b) colligative
c) additive d) additive & constitutive

3) Kjeldahl's method is used for estimation of _____ from compound.
a) C b) H
c) X d) N

4) The Prussian blue colour is obtained during the test of nitrogen by Lassaignes test is due to formation of _____.
a) $Na_4[Fe(CN)_6]$ b) $Fe_4[Fe(CN)_6]_3$
c) $Fe(CN)_2$ d) $Fe(CN)_6]$

5) In paper chromatography _____ type of filter paper is mostly used.
a) what man b) butter
c) sample d) ordinary

6) Cellulose fiber of paper absorb _____ as stationary phase.
a) $CHCl_3$ b) acetone
c) alcohol d) water

7) Adulteration by adding chalk powder can be detected by reacting sample with _____ as it liberates CO_2 gas.
a) $AgNo_3$ b) Urea
c) dil HCl d) Formalin

8) Yellow lead salts are added to _____ as an adulterants.
a) chili powder b) pulses
c) milk d) turmeric powder

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

a) What is the basicity of oxalic acid & HCl?
b) Draw neat labelled diagram of stalagmometer.
c) Define parachor. Give Macleod's equation.
d) Define polar & non polar molecule.
e) Write principle involved in the estimation of carbon & hydrogen by combustion method.
f) Write any two uses of paper chromatography.

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

a) Write names of any four physical method of food preservation.
b) Write the construction & working of Abbes refractometer.
c) Define the term:
i) Standard solution
ii) Molarity
iii) Molecular weight

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

a) A solution contains 50% water, 50% alcohol by mass. Calculate the mole fraction of each component in solution.
b) Explain the experimental procedure for paper chromatography.
c) How will you identify adulterants:
i) Water
ii) Starch
iii) Melamine
iv) Urea from milk

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

a) Define viscosity. Give its unit. How will you determine viscosity of liquid by Ostwald viscometer? Give two advantages of Ostwald viscometer.
b) Define qualitative analysis. How will you determine percentage by Carius method. In Sulphur estimation by Carius method 0.471×10^{-3} kg of organic compound gave 1.443×10^{-3} kg of $BaSO_4$ what is the percentage of Sulphur in compound.

SLR-DA-30

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper - IV)
Operating System (22221230)

Day & Date: Monday, 04-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) The process does not affects on another and should not affected by another process is known as _____ process.
a) Independent b) Dependent
c) Operative d) Co-operative

2) _____ is requirement for the solution to critical section problem.
a) Mutual exclusion b) Progress
c) Bounded Waiting d) All of above

3) _____ is also known as SWAP-OUT and SWAP-IN.
a) Process b) Overlays
c) Paging d) Swapping

4) Thread is HEAVY-WEIGHT process.
a) True b) False

5) PCB stands for _____.
a) Program Control Block b) Program Central Block
c) Process Control Block d) Process Central Block

6) To enable a process to be larger than the amount of memory allocated to it, we can use _____.
a) Overlays b) Fragmentation
c) Paging d) Segmentation

7) Program stored on a disk is also called as a Process.
a) True b) False

8) Reader Writer problem can NOT be solved using Two Process solutions.
a) True b) False

Q.2 Solve Any four questions. **08**

a) Define Time Sharing O.S.
b) List out two differences between Process and Program.
c) Define Scheduler.
d) What is Assignment Edge in RAG?
e) State the term Process Synchronization.

Q.3 Solve any two questions. **08**

a) Write a note on Multiprogramming O.S.
b) Write a note on Swapping.
c) Write a note on Reader Writers Problem.

Q.4 Solve any two questions. **08**

a) Define Scheduling and State Scheduling Criteria's.
b) Explain Compaction with its advantage and disadvantage.
c) Explain RAG.

Q.5 Solve any one question. **08**

a) Explain Priority Scheduling Algorithm with Example.
b) Define System Call and Explain types of System Calls.

SLR-DA-31

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - III)
Heat and Thermodynamics (22221205)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Any device which converts heat into mechanical work is called _____.
   a) refrigerator b) heat engine
   c) auto generator d) cycle

2) If the systems A and B are in thermal equilibrium with each other then _____.
   a) $\frac{T_A}{T_B} = 0$ b) $\frac{T_A}{T_B} = 1$
   c) $T_A \times T_B > 1$ d) $T_A \times T_B < 1$

3) To measure very low temperatures, the _____ thermometers are used.
   a) magnetic b) electric
   c) mercury d) clinical

4) An engine works between the temperatures 30 K and 300 K. What is its efficiency?
   a) 50% b) 47%
   c) 90% d) 10%

5) Diffusion of a gas is due to transport of _____.
   a) momentum b) energy
   c) mass d) None of these

6) In Joule Thomson effect, the fall in temperature is proportional to the difference in _____ on two sides of porous plug.
   a) pressure b) volume
   c) temperature d) mole

7) The second law of thermodynamics is concerned essentially with _____.
   a) nature of heat flow b) amount of heat flow
   c) speed of heat flow d) direction of heat flow

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) The diameter of nitrogen molecule is 3.2×10^{-10} m. The number of molecules at 0°C and 1 atmospheric pressure is 2.69×10^{25} per m^3. Calculate mean free path for nitrogen molecules.

2) What is Magneto-Caloric effect?

3) What is fountain effect of liquid He II?

4) Distinguish between Otto engine and Diesel engine.

5) Give principle of air conditioning system.

6) What is Joule-Thomson effect?

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

1) Effect of temperature and pressure on viscosity and thermal conductivity of a gas.

2) With a neat labelled diagram explain construction of vapour compression refrigeration system.

3) Linde's air liquefier.

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

1) Obtain Clausius expression for mean free path by collision cross section method.

2) Show that entropy change in reversible process is equal to zero.

3) A Carnot's refrigerator takes heat from water at 0°C and discard it to a room temperature at 27°C. 1 kg of water at 0°C is to be changed into ice at 0°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 Diesel cycle? Explain its operation and derive an expression for efficiency of Diesel engine.

2) Define adiabatic process and derive an expression for the work done in adiabatic process.

SLR-DA-32

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper–III)
Microbial Metabolism and Cultivation (22221220)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) _____ is the purine base of nucleic acids.
a) Cytosine b) Thymine
c) Uracil d) Adenine

2) Anticodons are present on _____.
a) m-RNA b) t-RNA
c) r-RNA d) DNA

3) RNA contains _____ sugar.
a) ribose b) deoxyribose
c) hexose d) triose

4) β - pleated sheets are the examples of _____ structure of protein.
a) Primary b) Secondary
c) Tertiary d) Quaternary

5) Blue green algae is an example of _____.
a) Photoatotroph b) Heterotroph
c) Saprophyte d) Chemotroph

6) DNA polymerase is _____.
a) intracellular enzyme b) extracellular enzyme
c) apoenzyme d) coenzyme

7) The repeating units of proteins are _____.
a) glucose b) amino acids
c) fatty acids d) nitrogen bases

8) The number of hydrogen bonds in between adenine and thymine are _____.
a) two b) three
c) four d) five

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

1) Mention two functions of lipids.
2) What is metabolism?
3) Name any two polysaccharides along with their monomers.
4) What are coenzymes?
5) What are autotrophs?
6) What is the role of agar agar in culture media?

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

1) Structure of t-RNA
2) Induced fit hypothesis
3) Secondary structure of proteins

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

1) Describe in detail about “High energy compounds”.
2) Discuss about “Differential. Enriched and Selective media”.
3) Write a note on “Extracellular enzymes”.

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

1) Write an essay on EMP pathway.
2) Describe the structure and function of DNA.

SLR-DA-33

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - IV)
Electricity, Magnetism and Basic Electronics (22221206)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) An instantaneous charge stored by the capacitor in the charging mode of a RC circuit at the time instant t = RC is _____.
   a) 63.2 % of the saturation charge
   b) 42.8 % of the saturation charge
   c) 72.2 % of the saturation charge
   d) 83.2 % of the saturation charge

2) The reciprocal of an impedance is called _____.
   a) susceptance b) reactance
   c) admittance d) conductance

3) By the multiplication of j^2 to the vector A, the vector A rotates through an angle _____.
   a) 90° b) 180°
   c) 45° d) 270°

4) According to the Biot and Savart law, the magnitude of magnetic induction due to the current carrying element at the point P which is at the distance r measured from the centre of it is directly proportional to _____.
   a) square of the length of an element
   b) distance r
   c) square of the distance r
   d) length of an element

5) When N_1 and N_2 be the number of turns in primary and secondary coils of the transformer respectively then for a step-down transformer _____.
   a) $N_1 = N_2$ b) $N_1 > N_2$
   c) $N_1 < N_2$ d) $N_1 = 0.5\ N_2$

6) The circuit which is used to remove the positive half cycle of the sinusoidal input is called _____.
   a) negative clamper b) negative clipper
   c) positive clamper d) positive clipper

7) When for Ballistic Galvanometer coil resistance is 100 Ω and current sensitivity 2 mm/μA then voltage sensitivity of it is _____.
   a) $0.03\ \mathrm{mm/\mu V}$ b) $0.3\ \mathrm{mm/\mu V}$
   c) $0.02\ \mathrm{mm/\mu V}$ d) $0.2\ \mathrm{mm/\mu V}$

8) When for a BJT, the value of current gain 'α' is 0.99 then the value of current gain is 'β' _____.
   a) 99 b) 100
   c) 200 d) 250

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

1) Write an expression for the instantaneous current flowing in RC circuit for discharging mode.
2) Write the formula to calculate the magnitude of magnetic induction at the point on the axis of an infinitely long current carrying solenoid.
3) Draw the circuit diagram of pi (π) filter.
4) For the BJT connected in CB configuration, define the term input resistance.
5) Calculate the resonance frequency of a series LCR circuit consisting L= 10 mH , C= 1 μF.

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

1) Owen's Bridge.
2) Ballistic Galvanometer.
3) Clamping Circuits.

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

1) Draw and explain the working of a common emitter transistor amplifier.
2) Derive an expression for the magnitude of magnetic induction at the centre point of a single turn current carrying circular coil.
3) In the circuit of a Zener diode voltage regulator, V_z = 12 V, V_{in} = 15 V, Rs =100 Ω and R_L = 1KΩ. Calculate the current flowing through Zener Diode Z and load resistor R_L.

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

1) Derive an expression for instantaneous current in a LR Circuit for the growth and decay modes.
2) For a parallel LCR circuit
   a) Derive an expression for the magnitude of impedance.
   b) Draw the frequency curve.

SLR-DA-34

Seat No.		Set	P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper - IV)
Applied Microbiology (22221221)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) _____ is the indicator of fecal pollution.
a) E.coli. b) Bacillus spp.
c) Staphylococcus spp. d) Azotobacter spp

2) _____ is used to determine the most probable number of the coliform per 100 ml of water sample.
a) Log table b) MacCardy's table
c) Long table d) Simple table

3) Nascent oxygen is produced in _____ step of water purification.
a) Primary b) Secondary
c) Tertiary d) All of the above

4) _____ is the example of sporadic disease.
a) AIDS b) Cholera
c) Typhoid d) common cold

5) Aerosols are formed during _____.
a) Sneezing b) Talking
c) Coughing d) All of the above

6) _____ is the example of the disease transmitted through physical contact.
a) AIDS b) Influenza
c) Dysentry d) Typhoid

7) The test used for differentiation of fecal from nonfecal coliforms is _____.
a) IMViC b) WIDAL
c) ELISA d) VDRL

8) COD stands for _____.
a) Biological Oxygen Demand b) Biochemical Oxygen Demand
c) Chemical Oxygen Demand d) None of the above

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

a) Differentiate between morbidity and mortality rate.
b) Define Pandemic disease.
c) What is opportunistic pathogen?
d) Give the significance of MPN.
e) What is incubation period?
f) What is the role of fomite in diseases?

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

a) Write the difference between epidemic and endemic diseases.
b) Write an account on sources microorganisms in water.
c) Explain the municipal water purification process – sedimentation.

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

a) Explain the prevention and control of water and food borne diseases.
b) Write an account on types of infection.
c) Give the difference between pathogenicity and virulence of the microorganism.

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

a) Write in details about treatment of sewage.
b) Explain various modes of transmission of diseases.

SLR-DA-35

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper–III)
Descriptive Statistics-II (22221211)

Day & Date: Thursday, 07-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The correlation coefficient _____.
a) is an absolute measure
b) is a relative measure
c) is both absolute & relative measure
d) none of these

2) If the correlation coefficient between two variables X and Y is 0.6, then the correlation coefficient between two new variables $U = \frac{X+6}{6}$ and $V = \frac{Y-6}{6}$ is _____.
a) 0.1 b) -0.1
c) 0.6 d) -0.6

3) Let the rank of n individuals be $1,2,3,\ldots n$ and $n, n-1,\ldots 1$ respectively. Then the rank correlation is_____.
a) $\frac{1}{2}$ b) 1
c) $-\frac{1}{2}$ d) -1

4) Let b_{yx} and b_{xy} b the regression coefficients. Then which one of the following is wrong?
a) $b_{yx} = 2, b_{xy} = \frac{1}{8}$ b) $b_{yx} = 5, b_{xy} = \frac{2}{5}$
c) $b_{yx} = -0.7, b_{xy} = -\frac{1}{28}$ d) $b_{yx} = 3.2, b_{xy} = 0.2$

5) The two lines of regression becomes identical when _____.
a) $r = +1$ b) $r = -1$
c) $r = 0$ d) Both (A) and (B)

6) The regression coefficient is independent of _____.
i) Origin
ii) Scale
a) neither i) nor ii) is true b) both i) and ii) are true
c) only ii) is true d) only i) is true

7) Index number is a special type of _____.
a) Average b) dispersion
c) correlation d) None of the above

8) In Lasperys price index number weight is considered as _____.

a) quantity in base year b) quantity during current year
c) prices in base year d) prices in current year

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

a) Define positive correlation with suitable example.
b) Given $Cov\,(X,Y) = -15, V(X) = 441, V(Y) = 484$ *Find* r_{xy}
c) State the expression for the acute angle between two regression lines and discuss the case when $r = 0$
d) Given the two lines of regression as $3X - 4Y + 8 = 0\ and\ 4X - 3Y = 1$ then find mean values of X and Y.
e) Define Laspeyre's price index numbers.

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

a) What is the effect of change of origin and scale on covariance?
b) Explain lines of regression.
c) Write a short note on index number

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

a) Explain scatter diagram.
b) The equations of two regression lines are
$X - 4Y - 5 = 0\ and\ X - 16Y - 64 = 0$
Find
i) Means of X and Y
ii) Coefficient of correlation between X and Y.
c) State important uses of index number.

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

a) Derive the formula for Spearman's rank correlation coefficient.
b) Derive the equations of lines of regression of Y on X by the method of least square.

SLR-DA-36

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper - III)
Comparative Anatomy of Vertebrates (22221232)

Day & Date: Thursday, 07-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice Questions. **08**

1) _____ is the functional unit of the kidney.
   a) Hilum b) Neurons
   c) Nephrons d) Medulla

2) A complete gill is called _____.
   a) Hemibranch b) Holobranch
   c) Abranch d) Lamilliform

3) The heart of Scoliodon is _____ chambered.
   a) Single chambered b) Two chambered
   c) Three chambered d) Four chambered

4) A fish's swim bladder functions for _____.
   a) speed b) breathing
   c) buoyancy d) body tempreture

5) Malpighian body is present in _____.
   a) skin b) liver
   c) kidney d) ovaries

6) Cavity enclosed by pectoral girdle is known as _____.
   a) Acetabulum b) Peritoneal
   c) Coelom d) Glenoid

7) _____ portion of stomach opens into small intestine.
   a) Cardiac portion b) Fundic portion
   c) Pyloric portion d) Body portion

8) The pericardium is a fibrous sac that encloses the _____.
   a) Heart b) Brain
   c) Kidney d) Stomach

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

1) Heart of Scoliodon
2) Functions of Integument
3) Pectoral girdle of Frog
4) Cutaneous respiration
5) Swim Bladder
6) Archenephros kidney

Q.3 Write Notes (Any Two) **08**

1) Compare the heart of Pigeon with heart of Rat.
2) Compare the integument of Frog with Calotes.
3) Integumentary glands of mammals.

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

1) Brief comparative account of brain of Pigeon with Rat.
2) Give an account of alimentary canal of rat.
3) Compare brain of calotes with pigeon.

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

1) Give an account of Pronephros, Mesonephros and Metanephros kidney.
2) Compare the alimentary canal of Calotes with Pigeon.

SLR-DA-37

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - IV)
Discrete Probability Distribution (22221212)

Day & Date: Friday, 08-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Which of the following is a condition of $P(X)$ to be p.m.f.?
a) $P(x) \geq 0$ b) $\sum P(x) = 1$
c) Both a and b d) Any one of a and b

2) For a discrete random variable X, the second moment about mean is called as second _____ moment.
a) Raw b) Factorial
c) Central d) None of these

3) Let X be a discrete uniform distribution taking values 5, 6, 7,…14, then $P(X > 9)$ is _____.
a) 0.5 b) 0.6
c) 0.4 d) 0.7

4) The sex of a new born child is recorded as male or female in a hospital is an real life situation where _____.
a) Binomial distribution is used b) Discrete uniform distribution is used
c) Bernoulli distribution is used d) None of these

5) Given mean = 4 and variance = 2 for Binomial random variable X, then values of n and p are _____.
a) 4 & 1/2 b) 2 & 1/2
c) 6 & 1/2 d) 8 & 1/2

6) $X \sim B\ (n, p)$ tends to $P(\lambda)$ distribution if _____.
a) $n \to \infty, p \to \frac{1}{2}$ b) $n \to \infty, p \to 0, np = \lambda < \infty$
c) $n \to \infty, p \to 1$ d) $n \to 0, p \to 0$

7) If X is a geometric r.v. then $P\left[{}^{X \geq 5}/_{X \geq 2}\right]$ is equal to _____.
a) $P[X \geq 5]\ P[X \geq 2]$ b) $P[X \geq 5]$
c) $P[X \geq 5]/P[X \geq 3]$ d) $P[X \geq 3]$

8) In which distribution, mean is always less than its variance is _____.
a) Poisson distribution b) Binomial distribution
c) Negative binomial distribution d) None of these

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

a) Define cumulative distribution function (c.d.f.) of discrete random variable X.

b) Show that $E(aX+b) = aE(X) + b$

c) Define one point distribution and state its mean.

d) Define Hyper-geometric distribution.

e) Define Poisson distribution.

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

a) If $P(X = x) = \frac{2x+1}{16}, x = 0,1,2,3$. Verify whether this function is p.m.f. If yes find mode of X.

b) Let the probability distribution of discrete random variable be

X:	0	1	2	3
P(x):	0.2	0.3	0.1	0.4

Find p. g. f. and hence find E(X)

c) Find mean and variance of Uniform distribution.

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

a) Find mean and variance of geometric distribution.

b) A random variable X assumes values -3, -2, -1, 0, 1, 2, 3 with equal probability. Find $E(X)$ and $E(2X+5)$

c) State and prove recurrence relation for probability of negative binomial distribution.

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

a) 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

i) $\mathrm{P}(2 < \mathrm{X} < 6)$

ii) $\mathrm{P}(\mathrm{X} \geq 5)$

iii) distribution function of X

b) Find probability generating function of binomial distribution. Hence find mean and variance.

SLR-DA-38

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper - IV)
Developmental Biology of Vertebrates (22221233)

Day & Date: Friday, 08-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice Questions. **08**

1) Spermatogenesis occurs in the _____.
a) Ovary b) Uterus
c) Testis d) Kidney

2) In frog the cleavage is _____.
a) Holoblastic b) Incomplete
c) Hemiblastic d) Meridional

3) During gastrulation, the blastomeres are arranged into _____ layers.
a) two b) three
c) four d) five

4) _____ is the process of forming the placenta.
a) Union b) Placentation
c) Placitation d) Discontinuation

5) The fetal portion of placenta formed by the chorionic villi of the _____.
a) Endometrium b) Allontois
c) Chorion d) Amnion

6) Metamorphosis is the process from _____ form.
a) Egg to larval b) Larval to adult
c) Larva to pupa d) Pupa to larva

7) In human the placenta is _____.
a) Haemochorial b) Endothelial
c) Epithiochorial d) Syndesmochorial

8) A fertilized egg is called as _____.
a) Germ cell b) Embryo
c) Zygote d) Blastula

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

1) Causes of miscarriages
2) Applications of ultrasound in human
3) Give structure of Hen egg
4) Fate map of blastula in chick
5) Types of twins in human
6) Hormonal regulation of metamorphosis in Tadpole

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

1) Describe the types of cleavages according to the fate of egg and morphology of blastomers.

2) What is Oogenesis? Illustrate the process of Oogenesis in mammals.

3) Define Apopstasis? Give the significance of Apostasis.

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

1) What is metamorphosis? Describe metamorphosis in frog.

2) What is spermatogenesis? Describe spermatogenesis in human.

3) What is fertilization? Describe mechanism of fertilization in human.

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

1) Describe types of placenta on the basis of histology in mammals.

2) What is gastrulation? Describe gastrulation in chick.

SLR-DA-39

Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - III)
Geometry (22221223)

Day & Date: Saturday, 09-12-2023 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) The relation between old coordinates (x, y) and new co-ordinate (x', y') of a point p when the origin is shifted to $0'(h, k)$ is _____.
   a) $x' = x + h, y' = y + k$ b) $x = x' + h, y = y' + k$
   c) $x = x' + h, y = y' - k$ d) $x = x' - h, y = y' + k$

2) A general second-degree equation represent parabola if and only if _____.
   a) $\Delta \neq 0, h^2 - ab = 0$ b) $\Delta = 0, h^2 - ab \neq 0$
   c) $\Delta = 0, h^2 - ab = 0$ d) $\Delta \neq 0, h^2 - ab < 0$

3) The polar equation of $xy = 2$ is _____.
   a) $r = \cos\theta$ b) $r = \sin\theta$
   c) $r = \sin 2\theta$ d) $r^2 \sin 2\theta = 4$

4) Equation of plane parallel to z axis is _____.
   a) $ax + by + cz + d = 0$ b) $ax + by + d = 0$
   c) $by + cz + d = 0$ d) $ax + cz + d = 0$

5) Angle between two planes $2x - y + z = 6$ and $x + 2y + 2z = 7$ is ____.
   a) $\pi/2$ b) $\pi/4$
   c) $\pi/3$ d) $\pi/5$

6) The equation of tangent plane at $p(x_1, y_1, z_1)$ to the sphere $x^2 + y^2 + z^2 = a^2$ is _____.
   a) $xx_1 - yy_1 - zz_1 = a^2$ b) $xx_1 + yy_1 - zz_1 = a^2$
   c) $xx_1 + yy_1 + zz_1 = a^2$ d) $xx_1 - yy_1 + zz_1 = a^2$

7) Intersection of two sphere is a _____.
   a) Circle b) Straight line
   c) Plane d) Sphere

8) The radius of the sphere $x^2 + y^2 + z^2 - 4x - 6y + 8z + 4 = 0$ is _____
   a) 5 b) -5
   c) 4 d) -4

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

a) Identify the conic of equation.
$x^2 + 2xy + y^2 - 2x - 1 = 0$

b) Find the polar co-ordinate of cartesian co-ordinate $(\sqrt{3}, 1)$

c) Show that the point $A\ (-2,3,5)\ B\ (1,2,3)\ C\ (7,0,-1)$ are colinear.

d) Find equation of plane through three points.
$A(1,1,1)\ B(1,-1,1)\ C(-7,-3,-5)$

e) Find equation of sphere whose centre at $(3,2,1)$ and radius 4.

f) Write the formula for relation between direction cosine and direction ratio.

Q.3 Answer the following (Any Two) **08**

1) Transform the equation $2x^2 + 4xy + 5y^2 - 4x - 22y + 7 = 0$ to parallel axes through the point $(-2,3)$

2) Obtain the normal form of the equation of plane.

3) Find the equation of tangent plane at $(1,2,-3)$ to the sphere
$x^2 + y^2 + z^2 - x + 2y + 3z = 8$

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

1) Transform the equation $x^2 + 4xy + y^2 = a^2$ when axes are rotated through an angle $\pi/4$

2) Obtain the equation of plane through the point $(-1,3,2)$ and perpendicular to two planes $x + 2y + 2z = 5$ and $3x + 3y + 2z = 8$

3) Find the centre and radius of the sphere $x^2 + y^2 + z^2 - 2x + 4y - 6z = 2$

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

1) To find the condition of tangency that the plane $AX + BY + CZ = D$ touches the sphere $x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$.
Also show that the plane $2x - 2y + z + 16 = 0$ touches the sphere
$x^2 + y^2 + z^2 + 2x - 4y + 2z = 3$

2) **a)** 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.

b) Find cartesian co-ordinates of the polar co-ordinate $(5, \pi/6)$ and $(-4, \pi/3)$

SLR-DA-40

Seat No.	

Set P

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

Day & Date: Saturday, 09-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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) A plants grows in water is called _____.
a) xerophytes b) hydrophytes
c) mesophytes d) nanophytes

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) shrub
c) moss d) crustose lichen

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

a) Define plant ecology.
b) What is successesion?
c) Define the hydrophyte.
d) What is edaphic factor?
e) Define community.
f) What is hydrosere?

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

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 ecological pyramids.

SLR-DA-41

Seat No.		Set	P

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

Day & Date: Sunday, 10-12-2023 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 the correct alternatives for each of the following. **08**

1) Which of the following is homogeneous differential equation?

a) $\frac{dy}{dx}=\frac{x+y+1}{x-y+1}$ b) $\frac{dy}{dx}=\frac{x^3+x^2y}{y^3-x^3}$

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

2) The solution of the differential equation $\frac{dx}{x}+\frac{dy}{y}=0$ is _____.

a) $x+y=C$ b) $\frac{y}{x}=C$

c) $x^2+y^2=C$ d) $xy=C$

3) In the differential equation $M(x,y)dx+N(x,y)dy=0$,if $\frac{\frac{\partial M}{\partial y}-\frac{\partial N}{\partial x}}{N}=f(x)$ then corresponding integrating factor is _____.

a) $e^{\int P dx}$ b) $e^{\int f(y)dy}$

c) $e^{\int f(x)dx}$ d) $e^{\int f(y)dx}$

4) The integrating factor of the equation $(1+x^2)\frac{dy}{dx}+2xy=\frac{1}{1+x^2}$ is _____.

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

c) e^{x^2} d) $1+x^2$

5) The solution of the differential equation $\frac{d^2y}{dx^2}+5\frac{dy}{dx}+4y=0$ is _____.

a) $y=c_1e^{-x}+c_2e^{4x}$ b) $y=c_1e^{x}+c_2e^{4x}$

c) $y=c_1e^{-x}+c_2e^{-4x}$ d) $y=c_1e^{x}+c_2e^{-4x}$

6) The value of $\frac{1}{D}[x^3]$= _____.

a) $\frac{x^4}{4!}$ b) $\frac{x^4}{4}$

c) $\frac{x^3}{3}$ d) $\frac{x^3}{3!}$

7) The value of $\frac{1}{D^2+4}[\cos 3x]$ = _____.

a) $\frac{\cos 3x}{5}$ b) $\frac{\sin 3x}{-5}$

c) $\frac{\cos 3x}{-5}$ d) $\frac{\sin 3x}{5}$

8) The particular integral of $(D-2)^3 y = e^{2x}$ is _____.

a) $\frac{xe^{2x}}{2}$ b) $\frac{x^3 e^{2x}}{3!}$

c) $\frac{x^3 e^{2x}}{3}$ d) $\frac{x^4 e^{2x}}{4!}$

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

a) Solve $x(1+y^2)dx + y(1+x^2)\,dy = 0$

b) Solve $(\sin x \cdot \cos y + e^{2x})\,dx + (\cos x \cdot \sin y + \tan y)\,dy = 0$

c) Solve $\frac{d^2y}{dx^2} + 4y = 0$

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

e) Show that $\frac{1}{D-a}[X] = e^{ax}\int X.e^{-ax}dx$

f) Solve $\log\left(\frac{dy}{dx}\right) = 2x + 3y$

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

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

b) Explain the method of solving Bernoulli's equation $\frac{dy}{dx} + PY = Qy^n, where\ P$ and Q are functions of x only.

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

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

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

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

c) With usual notation, prove that $\frac{1}{f(D)}[e^{ax}] = \frac{e^{ax}}{f(a)}, when\ f(a) \neq 0$

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

a) State and prove the necessary and sufficient condition for the differential equation $Mdx + Ndy = 0$ to be an exact.

b) With usual notations, prove that

i) $\frac{1}{f(D^2)}[\cos ax] = \frac{1}{f(-a^2)}\cos ax\,,\ when\ f(-a^2) \neq 0$

ii) $\frac{1}{f(D^2)}[\sin ax] = \frac{1}{f(-a^2)}\sin ax\,,\ when\ f(-a^2) \neq 0$

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Seat No.	

Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper - IV)
Taxonomy of Angiosperms (22221203)

Day & Date: Sunday, 10-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) _____ are commonly known as group of flowering plants.
a) Angiosperms b) Pteridophytes
c) Bryophytes d) Gymnosperms

2) The aim of taxonomy includes three aspects that are _____.
a) Identification b) Nomenclature
c) Classification d) All of these

3) The knowledge gained through taxonomy is useful in the fields of _____.
a) medicine b) agriculture
c) forestry d) all of these

4) Bentham and Hooker taxonomists who were closely associated with the Royal Botanical Garden at _____.
a) Kolkata b) Dehradun
c) Mumbai d) Kew

5) There are separate international codes of nomenclature in botany first published in _____.
a) 1902 b) 1901
c) 1903 d) 1904

6) International Code of Botanical Nomenclature (ICBN) was adapted from _____.
a) 1978 b) 1979
c) 1980 d) 1990

7) The national botanical Institute Lucnouw consist _____ herbaria.
a) 94000 b) 95000
c) 96000 d) 97000

8) Onion belongs to the family _____.
a) Solanaceae b) Liliaceae
c) amaranthaceae d) caesalpinaceae

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

a) Define taxonomy.
b) Write two character of primitive flower.
c) Define genus.
d) What is herbarium?
e) Give the two economic importance of family solanaceae.
f) What is angiosperms?

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

a) Aim of Taxonomy.
b) Demerits of Bentham and Hooker system.
c) Give the economic importance of family amaranthaceae.

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

a) Explain the natural classification studied by you.
b) Describe the principle of ICBN.
c) Explain the advanced characters of flower.

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

a) Give the family Caesalpinaceae with respect to systematic position, morphological character and economic importance.
b) Explain the significance of herbaria studied by you.

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Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper – III)
Semiconductor Devices (22221226)

Day & Date: Monday, 11-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The α of a transistor is 0.98, then the value of β is _____.
a) 49 b) 98
c) 90 d) 0

2) A pentavalent impurity has _____ valence electrons.
a) 2 b) 3
c) 4 d) 5

3) A doped semiconductor is known as _____ semiconductor.
a) intrinsic b) extrinsic
c) pure d) isolated

4) In _____ semiconductor holes are the majority charge carriers.
a) N-type b) P-type
c) Both a & b d) S-type

5) In transistor $I_B = 100\mu A$ & $\beta = 100$ then I_E = _____?
a) $10.1\ mA$ b) $10\ mA$
c) $1000\mu A$ d) $1\ mA$

6) The base of a transistor is _____ doped.
a) lightly b) moderately
c) heavily d) all of these

7) The forward voltage drop across silicon diode is about _____.
a) $7\ V$ b) $0.3\ V$
c) $3\ V$ d) $0.7\ V$

8) The current flowing through JFET is due to _____.
a) majority carriers
b) minority carriers
c) recombination of electrons and holes
d) all of these

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

a) Draw symbols of NPN Transistor and JFET with labels.
b) Compare BJT & UJT.
c) What is SCR? Draw its symbol.
d) Draw symbols of LED and photo diode
e) A typical transistor has $\beta = 99$. Calculate the value of α.
f) In a transistor circuit I_E = 1 mA, I_C = 0.94 mA. What is the value of I_B?

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

a) Write a note on Zener diode.
b) Write a note of DIAC.
c) Write a note on tunnel diode with the help of I-V characteristics

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

a) Define drain resistance, transconductance and amplification factor of a JFET. obtain the relation between them
b) Define α and β of a transistor. Obtain the relation between them.
c) Describe the formation of PN junction.

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

a) Explain input and output characteristics of a transistor in CB configuration.
b) Explain construction & I-V characteristics of D-MOSFET.

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Set P

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

Day & Date: Monday, 11-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Fill in the blanks by choosing correct alternatives given below. **08**

1) _____ is known as the father of Human Geography.
a) Humboldt b) Miss. Sample
c) Ratzel d) Blache

2) Secondary activities are called as _____ colour workers.
a) Red b) Blue
c) White d) Yellow

3) Race is a _____ term.
a) Economical b) Political
c) Physical d) Biological

4) Catholic and Protestant are the two groups of _____ religion.
a) Islam b) Christian
c) Hindu d) Buddha

5) Mecca and Madina are the important holy places _____ of religion.
a) Islam b) Christian
c) Hindu d) Buddha

6) _____ is the sub branch of Social Geography.
a) Transport Geography b) Agriculture Geography
c) Population Geography d) Marketing Geography

7) _____ is the largest language family and most widespread language in the world.
a) Austronesian b) Sino-Tibetan
c) Hametic-Semito d) Indo-European

8) The combine living of boys and girl is known as_____ of naga.
a) Tupic b) Gotul
c) Lonu d) Morung

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

a) Descriptive Nature of Human Geography.
b) Branches of Human geography
c) State the definite physical traits.
d) Physical Characteristics of Eskimo
e) State the languages of Sino- Tibetan family.

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

a) Explain the Importance of Human Geography.
b) Explain the region and Characteristics of Buddhism.
c) Economy of Nagas

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

a) State the types of races on the basis of colour of Skin.
b) State the type of Economic Activities.
c) State the region and climatic condition of Bushmen.

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

a) Explain the basis of racial classification.
b) Explain the various language families in the world.

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Set P

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

Day & Date: Monday, 11-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) An _____ is the area where the bed rock is exposed on the ground surface.
a) Outcrop b) Landscape
c) Landform d) None of these

2) Columnar joints divine the rock masses into _____ columns.
a) Tetragonal b) Pentagonal
c) Hexagonal d) All of these

3) Measure breaks in sedimentation are called _____.
a) fold b) unconformity
c) conformity d) fault

4) The sloping sides of a fold from crest to trough are called the _____.
a) limbs b) axis of fold
c) axial plane d) plunge of fold

5) The lowest point on the arch of syncline fold is called _____ of the fold.
a) trough b) crust
c) limb d) none of these

6) The trend of rock bed on the ground surface is called _____.
a) strike b) apparent dip
c) true dip d) none of these

7) Limbs in the isoclinal fold are _____ to each other
a) Parallel b) perpendicular
c) inclined d) tangential

8) Graben fault always form _____.
a) hill b) Basin
c) dome d) ridge

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

1) Define contour
2) Describe angular unconformity
3) What is dip and strike?
4) What is fault plane?
5) Define joints
6) What are anticline and syncline?

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

1) Elements of fold
2) Normal and reverse fault
3) Topographic maps

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

1) Describe horst and Graben faults.
2) Define outcrop. Describe width of outcrop.
3) Describe the geological maps.

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

1) Define fold. Describe any three types of fold.
2) Define fault, Describe terminology of fault.

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Set P

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

Day & Date: Tuesday, 12-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) TTL stands for _____.
a) Tran sister Transformer Logic b) Transistor Transistor Logic
c) Transformer Transformer Logic d) Trans receiver Transistor Logic

2) Demultiplexer 1:8 requires _____ number of AND gates.
a) 8 b) 2
c) 6 d) 4

3) R-S flip flop remains same when _____.
a) R+S=1 b) R=0, S=1
c) R=S=0 d) R=1, S=0

4) PIPO in shift register stands for _____.
a) Paper in paper out b) paper in parallel out
c) parallel in paper out d) Parallel in parallel out

5) In Johnsons counter _____ is connected back to input.
a) compliment of the output b) output
c) clock d) mode

6) _____ is priority encoder IC.
a) 7447 b) 74147
c) 7490 d) 7495

7) Serial counter is also called as _____ counter.
a) synchronous b) combination
c) asynchronous d) modulus

8) The JK flip flop is operated I toggle mode. If clock frequency is 10KHz, the output of flip flop toggles with _____.
a) 10KHz b) 20KHz
c) 40KHz d) 5KHz

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

a) In case of RS flipflop using NOR gate, when we get forbidden state?
b) Define The term Fan out and Fan in for TTL NAND gate
c) Name the different types of shift registers.
d) What is combination of counter?
e) Draw the timing diagram of MOD 5 counter.
f) What is priority encoder?

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

a) TTL NAND gate.
b) Master slave JK flip flop.
c) BCD to 7 segment decoders.

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

a) Explain SIPO shift register.
b) Explain specifications of TTL logic.
c) Explain decade counter using IC 7490.

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 8:1 multiplexer along with its necessary truth table.

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Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICAL GEOGRAPHY (Paper - IV)
Human Geography - II (22221236)

Day & Date: Tuesday, 12-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw diagrams where necessary.
4) Use of Stencils is permitted.

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

1) UNO declared _____ as World population day.
a) 11 July b) 12 July
c) 11 June d) 12 June

2) Density of population =_____/ total population.
a) Male population b) Female population
c) Area d) None of this

3) The demographic transition theory was put forward by F. Notestein in _____ year.
a) 1945 b) 1929
c) 1950 d) 1930

4) In the first stage demographic transition theory fertility and mortality rate are very _____.
a) Low b) Medium
c) High d) None of this

5) _____ is the main occupation of the ruler settlement.
a) Transport b) Industry
c) Agriculture d) Trade

6) Haridwar is _____ center.
a) Administrative b) Religious
c) Defense d) Trade

7) _____ Settlements developed at Tri-junctions of the road.
a) Circular b) Radial
c) Triangular d) T-shaped

8) The term agriculture is derived from the _____ language.
a) Greek b) Latin
c) Roman d) Spain

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

a) What is Age composition?
b) What is Sex Ratio?
c) Define Density of population.
d) What is urban settlement?
e) Define Shifting Cultivation.
f) Define plantation agriculture.

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

a) Describe the physical Factor affecting on the distribution of world population.
b) Describe classification of urban settlement.
c) Trend of Urbanization.

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

a) Distribution of world population.
b) Demerits of Demographic Transition Theory.
c) Problems of urban settlement.

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

a) Describe various types of Agriculture.
b) Describe rural settlement type and function.

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Set P

B.Sc. (Semester - II) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper - IV)
Crystallography (22221215)

Day & Date: Tuesday, 12-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) In _____ System, one axis is inclined.
a) Triclinic b) Hexagonal
c) Orthorhombic d) Monoclinic

2) Which of the following form belongs to Triclinic system?
a) Cube b) Octahedron
c) Quarter Pyramid d) Dodecahedron

3) In Monoclinic system, _____ Axes of symmetry present.
a) 7 b) 5
c) 1 d) 3

4) The general formula of Quarter pyramid is _____.
a) (100) b) (011)
c) (110) d) (1 -2 3)

5) Type mineral of Tetragonal system is _____.
a) Gypsum b) Beryl
c) Axinite d) Zircon

6) Which of the following form cuts all three axes?
a) Pyramid b) Octahedron
c) a & b both d) Basal Pinacoid

7) Smooth, flat surface of crystal is called as _____.
a) edge b) solid angle
c) face d) interfacial angle

8) In Basal pinacoid _____ faces present.
a) 6 b) 8
c) 2 d) 4

Q.2 Answer 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 Triclinic system.
d) Define combined forms of Crystal.
e) What is interfacial angle?
f) Define Pinacoid.

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

a) Crystallographic axes of Monoclinic and Tetragonal system.
b) Contact Goniometer.
c) Types of Pinacoid.

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

a) Describe Faces, Solid angle and Edges of crystal with labeled diagram.
b) Explain Planes and Axes of Symmetry.
c) Describe Di-Hexagonal prism.

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

a) Describe Crystallographic axes, Elements of Symmetry and any two forms of Cubic System.
b) Describe Crystallographic axes, Elements of Symmetry and any two forms of Orthorhombic System.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
ENGLISH (Comp.)
Literary Voyage (19201201) (20201201)

Day & Date: Saturday, 02-12-2023 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 the correct alternative from the option. **08**

1) _____ is the memorable part of discourse.
a) To give opportunity b) To talk
c) To listen d) To lead

2) According to Bertrand Russell, _____ had only one year of schooling.
a) Earnest Barker b) John D. Rockefeller
c) Jay Gould d) Vanderbilt Commodore

3) _____ plays a huge role and affects to an entire country.
a) Intrigue b) Monarchy
c) Hope d) Dismay

4) _____ release the arsenic urine.
a) Chemicals b) Profit factories
c) Infected waste d) The earth

5) Alexandra Pope wrote in _____ era.
a) Anglo-Saxon b) Modern
c) Augustan d) Romantic

6) The poet wishes to hear _____ from the lover.
a) marriage plans b) future plans
c) about the work d) about the family

7) Identify the correct synonym.
Amazing
a) Inquire b) Special
c) Incredible d) Idea

8) I saw a brown bird when I _____ the window.
a) opened b) was open
c) will open d) have open

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

a) How is humour and jest important of discourse?
b) What opinions does the author have of education system of his time?
c) What is the true sense of freedom?
d) Discuss the theme of the poem – 'Our Earth Will Not Die.'
e) What picture of a farmer does Alaxander Pope present in the poem – Ode On Solitude?
f) What are Rossetti's thoughts about remembering the dead person?

Q.3 Answer the following questions (Any One) **10**

a) Describe the process of making chapattis. Write the process step by step and use different linkers while writing the process.

b) Prepare a presentation on your favourite Cricketer / Film Hero / Heroine / National Leader, describing all the important details of them.

Q.4 Read the following advertisement and write an application letter for the post of a teacher based on the advertisement, giving all the details as required by it. **10**

Army Public School
Nigdi - Pune
Wanted
Teacher

Educational Qualification: BSc, BEd and as per CBSE by laws

Experience: Minimum 2 yrs. of experience, teaching to high school level

Interested candidates may forward their application letter along with their CV's, certificates at the email address: armypublicschool@gmail.com within 15 days of publishing the advertisement.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper - III)
Organic Chemistry (19201208)

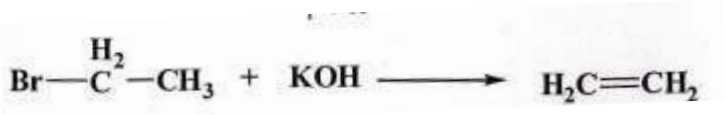
Day & Date: Sunday, 03-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple choice question. **08**

1) Which of the following species act as nucleophile?
a) $ZnCl_2$ b) $AlCl_3$
c) NH_3 d) BF_3

2) Below reaction is an example of



a) Substitution reaction b) Elimination reaction
c) Addition reaction d) Rearrangement reaction

3) Which of below compound having sp^2 hybridization?
a) ethane b) propene
c) but-2-yne d) none of the above

4) Which of the following molecule has highest bond energy?
a) butane b) but-2-ene
c) but-2-yne d) All of the above

5) Cyclopropane on reaction with H_2/Ni to gives _____.
a) propene b) n-propane
c) n-hexane d) Isopropane

6) Butadi-1, 3-ene is an example of _____ dienes.
a) conjugated b) cumulated
c) isolated d) non conjugated

7) Molecules that are having superimposable mirror image relationship are known as _____ molecule.
a) chiral b) achiral
c) non-symmetrical d) all of the above

8) All carbon atoms of naphthalene molecule are _____ hybridized.
a) sp b) sp^2
c) sp^3 d) all of the above

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

1) What are dienes? Give their examples.
2) Define addition reaction with example.
3) Draw the resonating structure of nitrobenzene.
4) Define Wurtz reaction with suitable example.
5) What is heterolytic fission? Give one example.
6) Define the Chirality.

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

1) Define optical isomerism with the help of lactic acid.
2) Explain benzenoid and non-benzenoid aromatic compounds with suitable examples.
3) Explain carbocation and carbanion with suitable examples.

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

1) Define reagents and explain its classification.
2) Explain acid catalyzed dehydration of ethyl alcohol with its mechanism.
3) Explain sp^2 and sp hybridization with suitable example.

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

1) Discuss the Friedel-Craft's alkylation and acylation reaction with example.
2) Write chemical reaction and product of following action:
   a) Propene on ozonolysis
   b) Propene on reaction with HBr
   c) Action of sodalime on sodium acetate
   d) Propyne on reaction with alkaline $KMnO_4$

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Set P

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

Day & Date: Sunday, 03-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 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) JavaScript is not case sensitive language.
a) True b) False

3) Which of the following is a singular tag?
a)
 b) <i>
c) <b> d) <u>

4) Class attribute is followed by _____ sign.
a) @ b) &
c) # d) .

5) In HTML5, the autofocus attribute is a _____ attribute.
a) Password b) Text
c) Boolean d) None of the above

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) Explain string function in JavaScript.
b) Write any four paired tag.
c) Define selector.
d) Explain ring topology with diagram.
e) What is image floating?
f) Define opacity.

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

a) Animation in CSS
b) Image Tag
c) Frameset tag in HTML

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

a) Explain form tag and use different input types with example
b) Explain for loop and while loop with example in JavaScript.
c) Explain different types of CSS.

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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Set P

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

Day & Date: Monday, 04-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The reciprocal of coefficient of viscosity is called _____.
a) viscosity b) parachor
c) fluidity d) None of these

2) The shape of liquid droplets is spherical due to _____.
a) viscosity b) dipole moment
c) surface tension d) None of these

3) CO is _____ pollutant.
a) inorganic b) organic
c) physical d) biological

4) Lassaigne's test for nitrogen gives _____.
a) purple colour b) black precipitate
c) blue or green colour d) white precipitate

5) Amberlite I.R -120 is _____.
a) ion exchanger b) cation ex changer
c) organic compound d) bio-organic compound

6) Carious method is used for the estimation of _____.
a) sulphur b) halogens
c) both a and b d) nitrogen

7) Natural gas contains highest percentage of _____.
a) methane b) ethane
c) cyclopropane d) all of these

8) Quality of gassolin is expressed in terms of _____.
a) octane number b) cetane number
c) cracking number d) none of these

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

a) Define the term dipole moment and give it's unit.
b) What is meant by term DO and COD?
c) Define hard water and soft water.
d) What is meant by pollutant and pollution?
e) Give the reaction for nitrogen detection.
f) Define the term octane number and craking.

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

a) What are the types of pollution? Explain any two.

b) What is green house effect? Explain.

c) Describe distortion and orientation polarization of molecule.

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

a) Explain the terms:

i) Specific refractivity

ii) Molecular refractivity

How are they related with each other?

b) Give any two advantages and disadvantages of icon exchange method.

c) Describe refining of petroleum in detail.

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

a) Explain Kjeldahl's method for estimating nitrogen in organic compound.

b) Describe experimental determination of surface tension of a liquid.

SLR-DA-55

Seat No.	

Set P

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

Day & Date: Monday, 04-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Which of the following is not a storage class in C?
a) auto b) register
c) static d) volatile

2) A function that calls itself is known as _____ function.
a) inbuilt b) return
c) recursive d) none of these

3) A _____ variable contains as its value is the address of another variable.
a) function b) pointer
c) global d) local

4) _____ function is used to close the opened file.
a) fclose() b) fopen
c) exit d) none of these

5) Which is the correct syntax to declare a file pointer in C?
a) File *file_pointer; b) FILE *file_pointer;
c) File file_pointer; d) FILE *file_name;

6) A C program contains _____.
a) At least one function b) No function
c) No value from command line d) All of these

7) _____ is the return type of function, if no value returned from the function.
a) double b) void
c) null d) float

8) automatic variables are stored in _____.
a) stack b) register
c) heap d) data segment

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

1) What is user defined function?
2) What is local and global variable?
3) What is pointer?
4) What is structure?
5) What is typedef?
6) Write the features of C processors.

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

a) Macros
b) Nested structure
c) Dynamic memory allocation

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

a) Explain getpixel and putpixel with example.
b) Write the difference between structure and union.
c) Write a C program to calculate factorial of entered number using function.

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

a) Explain different types of user defined functions with example.
b) Explain opening and closing file with example.

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Seat No.	

Set P

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

Day & Date: Tuesday, 05-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Fill in the blanks by choosing correct alternatives. (Eight) **08**

1) In an adiabatic process _____ of heat takes place between system and surrounding.
   a) exchange b) transport
   c) no exchange d) no transport

2) A heat engine with efficiency less than 100 % is _____.
   a) possible b) impossible
   c) practicable d) claimed

3) In vapour compression cycle the suitable working substance/s is/are _____ used.
   a) ammonia b) CO_2
   c) SO_2 d) all of these

4) Mechano - caloric effect is the property of _____.
   a) Liquid hydrogen b) liquid helium II
   c) liquid helium d) liquid oxygen

5) Calculate the change in entropy when 5 kg of water at 100 °C is converted into steam at the same temperature.
   a) ds = 7240 cal/°K b) ds = 7040 cal/°K
   c) ds = 2740 cal/°K d) ds = 7220 cal/°K

6) Using adiabatic demagnetization experiment the lowest temperature is of the order of _____.
   a) 0.0014 K b) 0.014 K
   c) 0.14 K d) 14 K

7) Viscosity of a gas is due to transport of _____.
   a) mass b) momentum
   c) energy d) none of these

8) Fuel of Otto engine is _____.
   a) air b) diesel
   c) petrol d) engine oil

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

1) What are transport phenomena?
2) State the Joule - Thomson effect.
3) A Carnot's engine working as refrigerator between 260 K and 320 K receives 512 calories of heat from the reservoir at the higher temperature. Calculate the amount of work done in each cycle to operate the refrigerator. (1 calorie = 4.2 Joules)
4) State second law of thermodynamics.
5) What is heat engine?
6) State the four stages of refrigeration cycle?

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

1) What is refrigeration cycle? Obtain the coefficient of performance of refrigerator.
2) Write the comparison between Otto and Diesel engine. Find the efficiency of Otto engine which has adiabatic expansion ratio is 8 and the ratio of specific heats of working substance is 1.4.
3) Write a note on air conditioning.

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

1) Explain the adiabatic demagnetisation process used for paramagnetic substances with neat labelled diagram.
2) Write a note on adiabatic process and derive an expression for the work done in an adiabatic process.
3) Explain the working of Carnot's cycle with neat labelled diagram and hence obtain an expression for efficiency. A Carnot engine, whose low temperature reservoir is at 7 °C, has an efficiency of 50%. It is desired to increase the efficiency to 70%. By how many degrees should the temperature of the high temperature reservoir be increased?

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

1) Define the coefficient of thermal conductivity and obtain an expression for it on the basis of transport phenomena. Explain its dependence on pressure and temperature?
2) Show that the entropy change in reversible process is zero and in irreversible process entropy always increases.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper – III)
Microbial Physiology (19201220)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) All the enzymes are protein in nature except _____.
   a) Ribozyme b) Nitroreductase
   c) Dehydrogenase d) Catalase

2) The hydrolysis of one ATP molecule releases _____ kcal/mol of energy.
   a) 7.3 b) 9.3
   c) 6.3 d) 5.3

3) _____ is present in MacConkey's agar.
   a) sodium deoxycholate b) sodium citrate
   c) sodium taurocholate d) sodium nitrate

4) Induced fit hypothesis was proposed by _____.
   a) Thomas cech. b) Watson
   c) E Fischer d) D. Koshland

5) Cellulase is _____ enzyme.
   a) Intracellular b) Inactive
   c) Slow d) Extracellular

6) Neutral red gives _____ color at acidic pH.
   a) Pink b) Blue
   c) Orange d) Yellow

7) _____ is the source of carbon and nitrogen.
   a) Blood b) Starch
   c) Peptone d) Agar

8) Each nucleotide occupies _____ space.
   a) 3.4A° b) 34A°
   c) 20A° d) 10A°

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

1) Coenzymes
2) tRNA
3) Heterotrophs
4) Generation time
5) Tertiary structural level in Protein
6) Lock and Key hypothesis

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

1) Active site of an enzyme
2) Classification of carbohydrates
3) Extracellular enzymes with specific examples

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

1) Structure of DNA
2) Growth phases in bacteria
3) Selective and differential components in the media, mention any four.

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

1) Nutritional classification of organisms based on carbon and energy source
2) EMP

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - IV)
Electricity, Magnetism and Basic Electronics (19201206)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H=1,C=12, 0=16, N= 14, Na =23, Cl = 35.5)

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

1) The decay current in L-R circuit is given by the relation _____.
a) $I = I_0\, e^{-\frac{R}{L}t}$ b) $I = I_0\, e^{-\frac{R}{L}}$
c) $I = I_0\, e^{\frac{R}{L}}$ d) $I = e^{-\frac{R}{L}t}$

2) In a capacitor, the potential difference across it lags behind the current through it by an angle of _____.
a) 360° b) 270°
c) 180° d) 90°

3) Unit of figure of merit (K) of a Ballistic galvanometer is _____.
a) $\mathrm{mm/\mu A}$ b) $\mathrm{\mu A/mm}$
c) $\mathrm{mm/\mu V}$ d) $\mathrm{mm/\mu C}$

4) Ripple factor of bridge rectifier is _____.
a) 0.812 b) 1.21
c) 0.484 d) 0.842

5) The relation between $\propto$ and β of bi-junction transistor is given by _____.
a) $\beta = \frac{\alpha}{1+\alpha}$ b) $\beta = \frac{\alpha}{1-\alpha}$
c) $\beta = 1+\alpha$ d) $\beta = 1-\alpha$

6) Zener diode is normally operated in _____ mode.
a) forward biased b) saturation
c) reverse biased d) none of these

7) If β of a transistor is 99, then its $\propto$ is _____.
a) 0.99 b) 0.90
c) 0.099 d) 9.9

8) Ballistic galvanometer is generally used to measure _____.
a) flux b) charge
c) voltage d) magnetic induction

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

1) What is the time constant of a circuit consisting of a resistance of 20 ohm in series with an inductance of 2 Henry?
2) Define admittance and mention its unit.
3) Draw neat diagram showing construction of Ballistic galvanometer.
4) State Biot Savart' Low.
5) Define quality factor in series LCR circuit and obtain equation.
6) Draw the circuit symbols of Zener diode, transistor, FET, UJT with terminal names.

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

1) Derive an expression for growth of current in a circuit containing an inductance(L) and resistance (R) and a source of constant e.m.f. (E) in series.
2) Explain Zener diode as voltage regulator.
3) Explain Owen's bridge.

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

1) With neat diagrams explain bridge rectifier with pi-filter.
2) A circuit consisting of a resistance of 50 ohm in series with an inductance of 5 H is suddenly switched on to a D.C. source of 100 V. Calculate the current after 0.5 seconds.
3) Explain the working of positive and negative clamper.

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

1) Obtain an expression for the magnetic induction at a point on the axis of current carrying straight solenoid of finite length.
2) With necessary diagrams explain input, output and transfer characteristics of transistor in CE mode and define the current amplification factor.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper - IV)
Applied Microbiology (19201221)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Rewrite the following sentences by selecting correct answers from given alternatives. **08**

1) _____ considered as an indicator of faecal pollution.
a) Bacillus b) Rhizobium
c) Pseudomonas d) E.coli

2) EMB agar is used for _____ test.
a) Presumptive b) Confirmed
c) Completed d) SPC

3) _____ is main protein present in milk.
a) Casein b) Albumin
c) Globulin d) Gelatine

4) _____ is used for disinfection of water.
a) Bromine b) Iodine
c) Alcohol d) Chlorine

5) The film of organisms formed on the trickling filter bed is known as _____ film.
a) Zoogloeal b) Bacterial
c) Phytogloeal d) Microbial

6) Efficiency of Pasteurisation is determined by _____ test.
a) MBRT b) Phosphatase
c) Resazurin d) Pasteur

7) Oxidation ponds used in biological treatment of sewage are also known as _____.
a) Tanks b) Filters
c) Lagoons d) Pots

8) An infection occurs during stay at hospital is called _____ infection.
a) Nosocomial b) Cross
c) Double d) Mixed

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

a) What is faecal pollution of water?
b) Define BOD.
c) Give the composition of milk?
d) What is Reinfection?
e) What is Pasteurisation?
f) What are the opportunistic pathogens?

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

a) MBRT test
b) IMViC test
c) Modes of transmission of diseases.

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

a) Describe in detail types of diseases.
b) Describe in brief sources of contamination of milk.
c) Describe in brief Municipal water purification.

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

a) Discuss in detail Biological methods for sewage treatment.
b) Describe in detail prevention and control of microbial diseases.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper – III)
Descriptive Statistics - II (19201211)

Day & Date: Thursday, 07-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The correlation coefficient _____.
a) is an absolute measure
b) is a relative measure
c) is both absolute & relative measure
d) none of these

2) If the sum of squares of the difference between 10 ranks of two series is 33, then the rank correlation coefficient is _____.
a) 0.80 b) 0.67
c) 0.967 d) 0.725

3) Let b_{yx} and b_{xy} b the regression coefficients. Then which one of the following is wrong?
a) $b_{yx} = 2, b_{xy} = \frac{1}{8}$ b) $b_{yx} = 5, b_{xy} = \frac{2}{5}$
c) $b_{yx} = -0.7\ b_{xy} = -\frac{1}{28}$ d) $b_{yx} = 3.2, b_{xy} = 0.2$

4) The standard deviation of two variables are $\sigma_1 = 2\ and\ \sigma_2 = 3$ and the correlation coefficient between them is $\frac{1}{2}$. If θ is the angle between the lines of regression for these variables then the value of tan θ will be.
a) $\frac{7}{13}$ b) $\frac{9}{19}$
c) $\frac{9}{13}$ d) $\frac{6}{19}$

5) With the three attributes A, B and C, the number of first order classes is ____.
a) 6 b) 9
c) 12 d) None of the above

6) The number of ultimate class frequencies for two attributes are _____
a) 2 b) 4
c) 6 d) None of these

7) Index number is a special type of _____.
a) average b) dispersion
c) correlation d) None of the above

8) Which index number is called as ideal index number?

a) Lasperys b) Paasches
c) Fisher d) None of the above

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

a) Define positive correlation with suitable example.
b) Prove that $Corr(X, X) = 1$
c) State the expression for the acute angle between two regression lines and discuss the case when $r = 0$
d) Define fundamental sets of class frequencies.
e) Define Fisher's quantity index numbers.

Q.3 Write Short Notes. (Any Two) **08**

a) What is the effect of change of origin and scale on covariance?
b) Explain lines of regression.
c) Explain the term association and disassociation with examples.

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

a) Explain scatter diagram.
b) State any two properties of regression coefficient. Prove any one of them.
c) State important uses of index number.

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

a) Derive the formula for Spearman's rank correlation coefficient.
b) Derive the equations of lines of regression of Y on X by the method of least square.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper - III)
Comparative Anatomy of Vertebrates (19201232)

Day & Date: Thursday, 07-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Multiple choice Questions. **08**

1) An exoskeleton of fishes is covered by _____.
   a) Scales b) Feathers
   c) Hairs d) Nails

2) The skin of frog is externally covered with _____ secretion.
   a) Rough b) Hairy
   c) Mucous d) Boney

3) The cavity of pelivc girdle is known as _____.
   a) Condyle b) Acetabulum
   c) Olecron d) Coelon

4) An oesophagus is absent in _____.
   a) Scoliodon b) Rat
   c) Frog d) Donkey

5) The gills are the only respiratory organs of _____.
   a) Amphibians b) Reptiles
   c) Birds d) Pisces

6) Nucleated RBCs are only found in _____.
   a) Humans b) Camel
   c) Cat d) Tiger

7) Well developed olfactory lobes are found in _____.
   a) Bat b) Frog
   c) Scoliodon d) Turtle

8) An archinephroic kidney is found in _____.
   a) Cyclostomes b) Mammals
   c) Reptiles d) Birds

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

1) Define the term an integuments and give suitable examples.
2) Describe pelvic girdle of pigeon.
3) Describe structure of air sacs of birds.
4) What are types of gill in pisces and compare with amphibians?
5) Describe structure of amphibian heart.
6) What is mesonephric kidney?

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

1) Describe structure of alimentary canal of reptiles and compare with pisces.
2) Describe exoskeleton of pisces and compare with mammals.
3) Describe different types of blood cells of mammals and compare with reptiles.

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

1) Describe pectoral girdle of amphibans and compare with mammals.
2) Describe lungs of birds and compare with reptiles.
3) What is difference between pronephric and metanephric kidney?

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

1) Describe structure an functions of brain of pisces and compare with aves.
2) Describe in detail structure of skeleton in vertebrates and comment upon its functions.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - IV)
Probability and Probability Distributions – II (19201212)

Day & Date: Friday, 08-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) If random variable X is a number appeared on throw of a fair die then $E(X) =$ _____.
a) 3 b) $7/2$
c) $1/6$ d) Does not exist

2) _____ moment is always zero.
a) First central b) First raw
c) First factorial d) Second raw

3) The joint p. m. f. of a bivariate r. v. (X, Y) is $P(X, Y) = K\ (x + y)$ $X = 1,2\ Y = 1,2$ then the value of k is _____.
a) $1/6$ b) $1/9$
c) $1/4$ d) $1/12$

4) If X and Y are two independent r.v.s then $V(X - Y)$= _____.
a) $V(X) + V(Y) - 2COV(X, Y)$ b) $V(X) + V(Y) + 2COV(X, Y)$
c) $V(X) + V(Y)$ d) $V(X) - V(Y)$

5) A random variable x follows one point distribution, then mean is equal to _____.
a) Zero b) One
c) Constant K d) None of these

6) Let X be a discrete uniform distribution taking values 5,6,7,…14, then $P(X > 9)$ is _____.
a) 0.5 b) 0.6
c) 0.4 d) 0.7

7) The number of parameters of hypergeometric distribution is _____.
a) One b) Two
c) Three d) None of these

8) If X has binomial distribution with parameter 10 and 0.7, then its mean is _____.
a) 10 b) 0.7
c) 0.3 d) 7

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

a) Define Expectation of r.v. X

b) Define joint probability mass function of r.v.'s (X, Y)

c) State the pmf of hypergeometric distribution with parameters N.M and n in usual notation.

d) Define one point distribution.

e) Define Uniform distribution.

f) Define conditional variance of X given $Y = y$.

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

a) What is effect of change of origin and scale on variance?

b) The joint p.m.f. of r.v. (X, Y) is given by

$$P(x, y) = \frac{|x + y|}{8} \quad x = -1,0,1, \quad y = -1,0,1$$

Find Marginal distribution of X and Y

c) Define two-point distribution and find its mean.

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

a) A random variable X assumes values -3, -2, - 1, 0, 1, 2, 3 with equal probability. Find $E(X)$ and $E(2X + 5)$

b) State and prove addition theorem on expectation.

c) State and prove the recurrence relation for probabilities of binomial distribution.

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

a) A r. v. X has following probability distribution

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

Find

1) k
2) E(X)
3) V(X)

b) Define Bernoulli distribution. Find its mean, variance and probability generating function.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper - IV)
Developmental Biology of Vertebrates (19201233)

Day & Date: Friday, 08-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Fill in the blanks by choosing correct alternatives: **08**

1) Ultrasound' is a reflection of _____.
a) soft tissues only b) hard tissues only
c) both soft and hard tissues d) hard muscles only

2) Blood islands present in _____ hrs of Chick embryo.
a) 18 b) 24
c) 33 d) 72

3) Anterior end of neural groove forms future _____.
a) Liver b) Spinal cord
c) Heart d) Brain

4) The gut or digestive tract of a vertebrate arises from the _____.
a) Vegetal pole b) Primitive streak
c) Archenteron d) Somites

5) Extra or missing chromosomes trigger genetic birth defects. What factor greatly increases the risk for an abnormal number of chromosomes in the fetus?
a) Older age of the mother b) Father's diet
c) Mother's diet d) None of the above

6) Nerve Cord cells are originated from _____.
a) Neuro-ectoderm b) Notochord
c) Mesoderm d) endoderm

7) Microlecithal egg is the egg of _____.
a) Frog b) Bird
c) Insect d) Amphioxus

8) The developmental stage which immediately follows fertilization is _____.
a) Gastrulation b) Cleavage
c) Neurulation d) Growth

Q.2 Answer the following questions briefly (any Four): **08**

1) Blastodisc
2) Define metamorphosis.
3) Irregulative type of egg
4) Define Epiboly.
5) Draw a figure of Discoidal with example.
6) Define Spermatogenesis.

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

1) Write note on miscarriage.
2) Give an account on functions of placenta.
3) Draw a labeled diagram of hen's egg.

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

1) Note on three germ layer formation in Amphioxus.
2) Explain hormonal regulation of metamorphosis in frog.
3) Describe types of twins in human.

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

1) Define Apoptosis and add a note on general mechanism and significance.
2) Describe Fate map of blastula in frog.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - III)
Geometry (19201223)

Day & Date: Saturday, 09-12-2023 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 alternative for each of the following **08**

1) The cartesian equation of $r = 4\sin\theta$ is _____
   a) $x^2 + y^2 - 4y = 0$ b) $x^2 + y^2 - 4x = 0$
   c) $x^2 + y^2 - 4 = 0$ d) $x^2 + y^2 - xy = 0$

2) The general second-degree equation represents a rectangular hyperbola if _____.
   a) $\Delta \neq 0, h^2 - ab > 0, a + b < 0$
   b) $\Delta \neq 0, h^2 - ab > 0, a + b = 0$
   c) $\Delta \neq 0, h^2 - ab > 0, a + b > 0$
   d) $\Delta \neq 0, h^2 - ab > 0, a + b \neq 0$

3) The equation of plane parallel to z-axis is _____.
   a) $ax + by + cz = 0$ b) $by + cz + d = 0$
   c) $ax + cz + d = 0$ d) $ax + by + d = 0$

4) The perpendicular distance between the parallel planes $2x - y + 2z + 3 = 0$ and $4x - 2y + 4z - 5 = 0$ is _____.
   a) $\frac{8}{3}$ b) $\frac{3}{8}$
   c) $\frac{11}{6}$ d) $\frac{6}{11}$

5) The direction cosines of the normal to the plane $2x - 3y + 6z = 7$ is _____.
   a) $\left(\frac{2}{7}, \frac{-3}{7}, \frac{6}{7}\right)$ b) $\left(\frac{-2}{7}, \frac{3}{7}, \frac{-6}{7}\right)$
   c) $(2, -3, 6)$ d) $\left(\frac{7}{2}, \frac{-7}{3}, \frac{7}{6}\right)$

6) The centre and radius of the sphere $x^2 + y^2 + z^2 + 2x - 4y - 6z + 5 = 0$ are _____.
   a) $c(2, -4, -6), r = 3$ b) $c(-1,2,3), r = 3$
   c) $c(-1,2,3), r = 5$ d) $c(2, -4, -6), r = 5$

7) The equation of sphere whose diameter is the line joining $(4,8,-3)$ and $(-2,3,5)$ is _____.
   a) $x^2 + y^2 + z^2 + 2x + 11y + 2z + 1 = 0$
   b) $x^2 + y^2 + z^2 + 2x + 11y + 2z - 1 = 0$
   c) $x^2 + y^2 + z^2 - 2x - 11y - 2z + 1 = 0$
   d) $x^2 + y^2 + z^2 - 2x - 11y - 2z - 1 = 0$

8) The equation $ax^2 + ay^2 + az^2 + 2ux + 2vy + 2wz + d = 0, a \neq 0$ represent a sphere if _____.

a) $u^2 + v^2 + w^2 + ad < 0$ b) $u^2 + v^2 + w^2 + ad > 0$

c) $u^2 + v^2 + w^2 - ad < 0$ d) $u^2 + v^2 + w^2 - ad > 0$

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

a) Transform the equation $3x^2 + 2xy + 4y^2 + 14x - 10y + 31 = 0$ to parallel axes through the points $(-3,2)$.

b) Identify the conic given by the equation $4x^2 - 12xy + 9y^2 + 4x + y + 5 = 0$

c) Show that the three points $(3,2,-1), (5,1,4), (-1,4,-11)$ are collinear.

d) Find the angle between the planes
$2x + 3y + 6z + 10 = 0$ and $x - 2y + 2z + 5 = 0$

e) Find the equation of sphere whose centre at (1,-4,3) and radius is 3.

f) Find the equation of a tangent plane to the sphere
$x^2 + y^2 + z^2 - 6x - 4y + 10z + 12 = 0$ at $(2,-1,-1)$

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

1) By rotation of axes through an angle θ, show that $g^2 + f^2$ is invariant in the equation of the curve $ax^2 + 2hxy + by^2 + 2gx + 2fy + c = 0$

2) Find equation of the plane which passes through the points (-2,1,1), (-3,5,-2) and is parallel to the line joining the points (-1,2,0) and (3,-4,-1)

3) Find the equation of a tangent planes to the sphere
$x^2 + y^2 + z^2 - 2x + 4y + 6z - 16 = 0$ which are parallel to the plane
$x + 5y + 2z - 1 = 0$

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

1) Change the equations
i) $x^2 - y^2 = 2ay$ to polar form
ii) $2\sin 2\theta = 1$ to cartesian form

2) Show that the equation of plane whose normal from the origin has the direction cosines l, m, n and length P is $lx + my + nz = P$

3) Show that the second-degree equation
$x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ represents a sphere with centre $(-u, -v, -w)$ and radius $\sqrt{u^2 + v^2 + w^2 - d}$

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

1) If axes are rotated through an angle θ, the equation $ax^2 + 2hxy + by^2$ transform into $a'x'^2 + b'y'^2$ then prove that $\theta = \tan^{-1}\left(\frac{2h}{a-b}\right)$

2) Show that the equation of a tangent plane to the sphere
$x^2 + y^2 + z^2 + 2ux + 2vy + 2wz + d = 0$ at a point (x_1, y_1, z_1) is
$xx_1 + yy_1 + zz_1 + u(x + x_1) + v(y + y_1) + w(z + z_1) + d = 0$

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Set P

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

Day & Date: Saturday, 09-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Rewrite the following sentences by choosing correct alternative. **08**

1) _____ is essential for existence of life.
a) Water b) Temperature
c) Soil structure d) Soil porosity

2) The plant grows in extremely Water habit are known as _____.
a) Oxalophytes b) Xerophytes
c) Mesophytes d) Hydrophytes

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) Sociability of plant community is _____ types.
a) S_1 b) S_5
c) S_3 d) S_4

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

a) Define the pediology?
b) Define Food Web?
c) What is mean by primary succession?
d) Give the components of grassland ecosystem?
e) Give the chemical properties of soil.
f) What is men by Species Diversity?

Q.3 Write short notes following questions (any two). **08**

1) Write the useful effects of wind?
2) Write the note on Stratification.
3) What is men by Pyramid of Energy?

Q.4 Answer the following questions (any two). **08**

a) Write morphological characters of hydrophytes.
b) Describe the effects of Temperatures on the plants growth and development.
c) Write note on Grass-land ecosystem.

Q.5 Answer the following (any one). **08**

a) What is ecological pyramid? Describe pyramid of number in ecosystem.
b) What is men by Climatic Factor? Add different the Climatic Factors by you Studded.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper-IV)
Differential Equations (19201224)

Day & Date: Sunday, 10-12-2023 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 the correct alternatives from the options. **08**

1) The Equation $\frac{dy}{dx} = \frac{2x+y-5}{4x+2y+1}$ is _____.

a) Homogeneous b) Non- homogeneous
c) Exact d) Linear

2) 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) $\cos^{-1}x + \sin^{-1}y = c$
c) $\sin^{-1}x + \sin^{-1}y = c$ d) $(1-x^2)(1-y^2) = c$

3) The I.F. of the Equation $\frac{dy}{dx} + py = Q$ is_____ where P & Q are function of x or constant.

a) $e^{\int p dy}$ b) $e^{\int p dx}$
c) $e^{-\int p dx}$ d) $e^{-\int p dy}$

4) The equation $(x^2 - ay)\,dx + (y^2 - ax)\,dy = 0$ is _____.

a) Homogeneous b) Variable separable
c) Exact d) linear

5) The general solution of $(D-1)^3 y = 0$ is _____.

a) $y = c_1 + c_2 x + c_3 x^2$ b) $y = (c_1 + c_2 x + c_3 x^2)e^{-x}$
c) $y = (c_1 + c_2 + c_3)e^{x}$ d) $y = (c_1 + c_2 x + c_3 x^2)e^{x}$

6) The general solution of $D^2(D-z)y = 0$ is_____.

a) $y = c_1 + c_2 e^{2x}$ b) $y = (c_1 + c_2 x)e^{2x} + c_3 x^2$
c) $y = c_1 + c_2 x + c_3 e^{2x}$ d) $y = c_1 + c_2 x + c_3 e^{-2x}$

7) The value of $\frac{1}{D^2+1}\cos x$ is _____.

a) $x \cos x$ b) $\frac{x}{z}\sin x$
c) $\frac{x}{z}\cos x$ d) $-x\cos x$

8) The value of $\frac{1}{f(D)}(e^{ax}v) =$ _____.

a) $e^{ax}\frac{1}{f(D+a)}v$ b) $e^{ax}\frac{1}{f(D-a)}v$
c) $e^{ax}\frac{1}{f(D)}v$ d) None of these

Q.2 Attempt the following (Any Four) **08**

a) Solve $(D^2 + 3)y = 0$

b) Find $\frac{1}{D^2} - (x^3)$

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

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

e) Solve $\frac{d^3y}{dx^3} - y = 0$

f) Find I.F. of $(1 + x^2)\frac{dy}{dx} + 2xy = \cos x$

Q.3 Attempt the following (Any Two) **08**

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

b) Solve $x\frac{dy}{dx} + y\log y = xy\, e^x$

c) State the four rules for finding integrating factors of the equation $M\, dx + Ndy = 0$

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

a) Evaluate $\frac{1}{(D-1)(D-2)}e^{3x}$

b) Solve $(x^2 - 4xy - 2y^2)dx + (y^2 - 4xy - 2x^2)dy = 0$

c) Solve $(x^2 + y^2)dx - 2xy\, dy = 0$

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

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

b) Solve $(2x + 3y + 1)dx + (3x + 4y - 1)dy = 0$

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper - IV)
Taxonomy of Angiosperms (19201203)

Day & Date: Sunday, 10-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) _____ was father of taxonomy.
a) Alexander b) Leeuwenhoek
c) Linnaeus d) Pearson

2) In binomial nomenclature first name used for plant is _____ name.
a) Species b) Genus
c) Family d) Order

3) Benthum & Hookers system of classification is one of the _____ system.
a) Natural b) Artificial
c) Phylogenetic d) Physiological

4) _____ among the following is an advance character of angiosperms.
a) Unisexual flower b) Bisexual flower
c) Tree habit d) Reticulate venation

5) Presence of _____ type of inflorescence is characteristic feature of family Amaranthaceae.
a) Cymose b) Catkin
c) Spike d) Hypanthodium

6) _____used for poisoning treatment of herbarium.
a) Alcohol b) Hgcl2
c) Nitrogen d) Hexane

7) Arrangement of flowers on peduncle is called as _____.
a) Phyllotaxy b) Pedicel
c) Inflorescence d) Aestivation

8) Small leaf like structure present at the base of flower is called as _____.
a) Stipule b) Bract
c) Placentation d) Phyllotaxy

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

a) Define botanical gardens.
b) Define natural system of classification.
c) Define morphological characters.
d) Write any four vegetative characters of family Liliaceae.
e) Give the lawful arrangement of plant species.
f) What is systematic?

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

a) What is taxonomy? Describe direct method of identification.
b) Write note on Binomial nomenclature.
c) What are aims of taxonomy?

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

a) Write a note on Lead botanical garden, Kolhapur.
b) Write a note on vegetative & reproductive characters of family Caesalpiniaceae.
c) Write a note on types of inflorescences.

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

a) Write a note on primitive and advance characters of angiosperms.
b) Write a note on Principles of ICBN.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper – III)
Semiconductor Devices (19201226)

Day & Date: Monday, 11-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) A Pentavalent impurity has _____ valence electrons.
a) 2 b) 4
c) 3 d) 5

2) The cut in voltage for Germanium pn junction is _____.
a) 0.3V b) 1V
c) 2V d) 0.7V

3) A JFET is a _____ controlled device.
a) Voltage b) Current
c) Both voltage and current d) All of these

4) Capacitance of varactor diode _____with increase in reverse voltage.
a) increases b) decreases
c) remains constant d) All of these

5) In transistor symbol, the direction of arrow head on emitter shows_____.
a) Conventional current b) Bias Voltage
c) Reverse current d) All of these

6) The value of α of transistor is _____.
a) Zero b) two
c) nearly equal to one d) three

7) The base of a transistor is_____ doped.
a) Lightly b) Heavily
c) Moderately d) all the these

8) Triac has number of junctions equal to_____.
a) 5 b) 2
c) 3 d) 4

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

a) Define h parameters for CE configuration
b) A transistor has $\alpha = 0.99$, Calculate β
c) State any two acceptor impurity and any two donor impurity.
d) Give the applications of LED.
e) If $I_E = 2mA \; and \; \alpha = 0.98$, calculate I_C?
f) Draw symbols of NPN Transistor and JFET with labels.

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

a) Zener Diode
b) UJT
c) Tunnel Diode

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

a) Define drain resistance (rd), trans-conductance (gm) and amplification factor (μ). Derive the relation between them.
b) Explain construction and working of Photodiode.
c) Define current gain α and β in case of BJT. Derive relation between them.

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

a) Explain construction and working of SCR.
b) Explain input and output characteristics of a transistor in CB configuration.

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B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
PHYSICAL GEOGRAPHY (Paper - III)
Human Geography I (19201235)

Day & Date: Monday, 11-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) _____ geography is the branch of human geography.
a) Cultural b) Oceanography
c) Geomorphology d) Climatology

2) _____Geography is a study about interrelationship between physical environment and socio-cultural environment created by human beings through mutual interaction with each other.
a) Human b) Economic
c) Political d) None of these

3) _____ is the second largest group according to percentage of population in the world.in 2023.
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) Griffith Taylor, an _____ geographer, proposed a classification of the human race into three main groups.
a) Indian b) European
c) American d) Australian

6) Bushmen tribe are found in the Kalahari desert of _____.
a) Australia b) Europe
c) America d) Africa

7) Eskimo most Inuit wintered either in snow-block houses referred to as ____.
a) Igloos b) Slab
c) Tent d) None of these

8) ____ is the biggest religion in the world in 2023?
a) Christianity b) Hinduism
c) Judaism d) Islam

Q.2 Answers of the following question (Any Four) **08**

a) Define the Human geography?
b) In which state (Only name) Naga tribe is located?
c) What are the branches of human geography?
d) Which religion is number third in the world?
e) How many religious groups (any two names) in India?

Q.3 Write a Short notes on (Any Two) **08**

a) Importance of human geography.
b) Human Race
c) Eskimo Tribe

Q.4 Answers of the following question (Any Two) **08**

a) Explain the nature and scope of human geography?
b) Describe the various religions groups in the world?
c) Explain the racial classification by Griffith Taylor?

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

a) Define the human geography and explain it's branches?
b) Explain the language groups in the world?

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Set P

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

Day & Date: Monday, 11-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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, one horizontal axis is inclined.
a) Cubic 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) Quarter Pyramid has _____ faces.
a) 6 b) 8
c) 2 d) 4

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

1) What is a Crystal?
2) Describe Planes and Axes of Symmetry of Tetragonal System.
3) Draw labeled diagram of crystallographic axes of Cubic system.
4) Define combined forms of Crystal.
5) What is interfacial angle?
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) Hexa-octahedron and Dodecahedron

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

1) Describe Faces, Solid angle and interfacial angle of crystal with labeled diagram.
2) Explain Plane and Axes of Symmetry.
3) Draw and Describe Octahedron crystal.

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

1) Define crystal. Describe Crystallographic axes, Elements of Symmetry and any two forms of Hexagonal System.
2) Define crystal. Describe Crystallographic axes, Elements of Symmetry and any two forms of Orthorhombic System.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper – IV)
Digital Electronics (19201227)

Day & Date: Tuesday, 12-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) If the propagation delay time of a standard TTL gate is 100 nano-second, its operating speed is _____.
a) 0.1 MHz b) 1 MHz
c) 10 MHz d) 100 MHz

2) Which one of these ICs is a Decimal to BCD Priority Encoder?
a) 74147 b) 7447
c) 74138 d) 74153

3) The number of control lines required for constructing 8 to 1 multiplexer is ____.
a) 1 b) 2
c) 3 d) 4

4) The major drawback of simple JK flip-flop is _____.
a) forbidden state b) toggle state
c) race-around condition d) non-triggerable

5) The type of shift register used to load 8-bit data simultaneously and shift it out 1-bit at a time is _____.
a) PISO b) SIPO
c) SISO d) PIPO

6) If the propagation delay of a flip-flop is 1 μSec, the time required to shift an 8-bit data serially, using ripple counter, will be _____.
a) 1 μSec b) 2 μSec
c) 4 μSec d) 8 μSec

7) IC 7495 is a _____.
a) 4-bit decade counter b) 4-bit shift register
c) 4-bit binary counter d) all of these

8) The standard TTL range for valid digital high input is _____.
a) 0 to 0.8 V b) 2 to 5 V
c) 0 to 0.4 V d) 2.4 to 5.0 V

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

a) Show the timing diagram for mod-5 counter.
b) Draw the block diagram of 4 to 1 multiplexer.
c) What are different types of shift-registers?
d) What is propagation delay time?
e) Draw the gate diagram of RS flip-flop.
f) Show the block diagram of T-flip-flop with its truth table.

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

a) Write a note on TTL NAND gate.
b) Write a note on JK flip-flop. Draw the timing diagram.
c) Write a note on input-output voltage limits of standard TTL logic family.

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

a) Explain decade counter using IC 7490. Draw the timing diagram.
b) Discuss Edge-triggered D flip-flop.
c) Discuss the sinking and sourcing characteristics of standard TTL NAND gate.

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

a) Explain in detail, a BCD to seven-segment decoder using IC 7447.
b) Explain the use of IC 7495 as left-shift and right-shift register. Draw its timing diagrams.

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

Day & Date: Tuesday, 12-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple Choice question. **08**

1) The major concentration of population in the world is found in _____ region.
a) Plain b) Plateau
c) Mountain d) Valley

2) The demographic transition theory was put forward by and _____ Notestein.
a) Ratzel b) Humbolt
c) Thompson d) Ritter

3) Mecca and Medina are _____ centers.
a) Defense b) Administrative
c) Industrial d) Religious

4) _____ is the main occupation of the urban settlement.
a) Agriculture b) Transport
c) Industry d) Trade

5) The term Agriculture is derived from _____ language.
a) Latin b) Greek
c) Roman d) Spain

6) Soil erosion is a _____ problem of agriculture.
a) Economic b) Political
c) Social d) Physical

7) Agriculture is _____ type of economic activity.
a) Primary b) Secondary
c) Tertiary d) Quaternary

8) In the first stage of demographic transition the birth rate and death rate _____.
a) Low b) High
c) Medium d) Very low

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

a) Define population density.
b) Define sex ratio.
c) Explain the Characteristics of Urbanization.
d) Write types of urban settlement.
e) Define shifting agriculture.
f) Give list of physical factor that affecting on agriculture.

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

a) Age structure.
b) Problems of urban settlement.
c) Intensive Subsistence Agriculture.

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

a) Explain the factor affecting on distribution of population.
b) Describe the problems of Agriculture.
c) State the characteristics of mixed farming.

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

a) Explain Demographic Transition Theory.
b) Describe types and pattern of rural settlement with suitable diagram.

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Set P

B.Sc. (Semester - II) (Old) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper - IV)
Mineralogy (19201215)

Day & Date: Tuesday, 12-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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) In polarized light. Cracks are shown by_____.
a) Calcite b) Microcline
c) Olivine d) Biotite

2) Silky luster is shown by _____.
a) Calcite b) Microcline
c) Garnet d) Asbestos

3) Upper Nicol prism is called as _____.
a) Analyzer b) Condenser
c) Polarizer d) Mirror

4) Pale green to dark green pleochroism is shown by _____.
a) Hornblende b) Microcline
c) Olivine d) Biotite

5) Ore minerals are identified by using _____.
a) Cleavage b) Streak
c) Form d) Fracture

6) A ray of light traveling in one direction and in one plane is called _____.
a) Monochromatic b) Ordinary
c) Polarized d) Refracted

7) Plagioclase shows _____ twinning.
a) Simple b) cross hatched
c) Symmetrical d) Repeated

8) Pisolitic form is present in _____.
a) Calcite b) Bauxite
c) Garnet d) Asbestos

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

a) Define Isotropism.
b) Define Streak of Minerals.
c) Describe Bladed and Columnar form of minerals with examples.
d) Give the names of any two minerals showing Pleochroism.
e) Give Chemical composition and physical properties of Olivine?
f) Define Fracture in Minerals.

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

a) Cleavage of minerals with example.
b) Relief and their types.
c) Hardness of Mineral and Scale.

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

a) Describe Pleochroism with example.
b) Describe Biotite Mineral.
c) Explain Lower assembly of Polarized Microscope.

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

a) Define Mineral. Describe Physical properties, chemical composition, Optical properties of Orthoclase and Microcline.
b) Define Mineral. Describe Physical properties, chemical composition, Optical properties of Garnet and Calcite.

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B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper - V)
Organic Chemistry (22221330)

Day & Date: Wednesday, 13-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of logarithmic table and calculator is allowed.
5) All Questions carry equal marks.
(At. Wts.: H=1, C=6, O=16, N=14, Na=23, Cl= 35.5)

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

1) Basic λ_{max} for $\alpha - \beta$ unsaturated aldehyde is _____ nm.
a) 205 b) 214
c) 215 d) 207

2) Phenol can be converted into salicylic acid by _____.
a) Fries rearrangement b) Kolbe reaction
c) Gattermann synthesis d) Claisen reaction

3) Which of the following is used as an anesthetic?
a) Ether b) Methanol
c) Epoxide d) Ethyl alcohol

4) Epoxides are _____.
a) Open chain ethers b) Crown ethers
c) Three membered cyclic ethers d) None of these

5) In aldehydes carbon atom of-CHO group is in _____ hybridized state.
a) SP b) SP^2
c) SP^3 d) SP^3d^2

6) Benzoin possess _____ hydroxyl group.
a) Primary b) Secondary
c) Tertiary d) All of these

7) Hell- Volhard Zelinsky reaction is used for preparation of _____ acids.
a) Hydroxy b) Dicarboxylic
c) Unsaturated d) Halo

8) E and Z nomenclature is used for determination of configuration of _____ isomers.
a) Optical b) Geometrical
c) Conformational d) None of these

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

a) Write reactions involved in oxidation of glycerol.
b) Write two methods of preparation of anisole.
c) What is Perkin's reaction?
d) Write the uses of acrylic acid.
e) Define:
a) Configuration b) Conformation

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

a) Configuration of aldoximes.
b) Knoevenagel reaction.
c) Acid and base catalyzed ring opening reaction of ethylene oxide.

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

a) Write two methods of formation of ethylene glycol.
b) Describe Reimer- Tiemann reaction with mechanism,
c) Describe conformational analysis of ethane with the help of energy profile diagram.

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

a) Write two methods of preparation of phthalic acid. What is the action of soda lime and ammonia on phthalic acid?
b) Explain various types of electronic transitions in UV spectroscopy.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper – V)
Data Structure (22221320)

Day & Date: Saturday, 23-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The Data structure used in standard implementation of Breadth First Search is?
   a) Stack b) Queue
   c) Linked List d) Tree

2) Which of the following linked list below have last node of the list pointing to the first node?
   a) circular doubly linked list b) circular linked list
   c) circular singly linked list d) doubly linked list

3) Which of the following sorting procedures is the slowest?
   a) Quick sort b) Heap sort
   c) Shell sort d) Bubble sort

4) The balance factor of a node in a binary tree is defined as _____.
   a) addition of heights of left and right subtrees
   b) height of right subtree minus height of left subtree
   c) height of left subtree minus height of right subtree
   d) height of right subtree minus one

5) The in order traversal of tree will yield a sorted listing of elements of tree in _____.
   a) Binary trees b) Binary search trees
   c) Heaps d) None of above

6) The dummy header in linked list contain _____.
   a) First record of the actual data
   b) Last record of the actual data
   c) Pointer to the last record of the actual data
   d) None of the above

7) A queue data-structure can be used for _____.
   a) expression parsing b) recursion
   c) resource allocation d) all of the above

8) If every node u in G is adjacent to every other node v in G, A graph is said to be _____.
   a) isolated b) complete
   c) finite d) strongly connected

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

a) Define dequeue.
b) What is Binary tree? List out various types of binary trees.
c) What is push and pop in stack?
d) What is prefix expression A + (B / C) * D - E + F.
e) What is doubly linked list?
f) What binary search tree?

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

a) AVL Tree
b) Selection Sort technique
c) Priority Queue

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

a) What is Binary Search tree? Explain the process to insert new node in binary search tree with its algorithm.
b) Write a program of Insertion sort.
c) What is linked list? Explain various types of linked list.

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

a) Write a program for all traversal method of binary search tree.
b) Write program of binary search.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper – VI)
Inorganic Chemistry (22221331)

Day & Date: Thursday, 14-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat and labeled 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 Select the correct alternative from the following. **08**

1) Colour of most of transition metal ions or their compounds is due to _____ transition.
a) s-d b) d-d
c) s-s d) s-p

2) 8-hydroxy quinoline has _____ coordinating group and _____ acidic group respectively.
a) two, two b) two, one
c) one, two d) one, one

3) _____ is an example of soft base.
a) I^- b) Cl^-
c) Br^- d) F^-

4) EAN i.e. Effective atomic number of platinum in $[PtCl_6]^{2-}$ complex ion is _____.
a) 36 b) 56
c) 86 d) 85

5) _____ is an element of third transition series which show anomalous electronic configuration.
a) Tungsten b) Copper
c) Niobium d) Platinum

6) Alcoholic solution of DMG in presence of _____, give scarlet red colour with Ni^{2+} ion.
a) iodine b) alcohol
c) ammonia d) acid

7) Lewis base is electron _____ chemical species.
a) deficient b) rich
c) elecrophilic d) acceptor

8) The IUPAC nomenclature of $[FeF_6]^{3-}$ is _____.
a) Hexafluoroferrate(III) ion b) Hexa fluoro ferrate (III)
c) Hexafluoroferrate(II) ion d) Hexafluoroferrous (III) ion

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

a) Define:
   i) Double salt
   ii) Optical isomerism

b) Write the observed electronic configuration of Molybdenum and Silver.

c) Explain in brief Lewis acid with one example.

d) Give any two points of distinction of metal complex and metal chelate.

e) Write only factors that affects the co-ordination number of metal ion in complex.

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

a) Geometrical isomerism

b) Application of EDTA as chelating agent.

c) Catalytic properties of 3d-block elements.

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

a) Discuss Werner's theory of coordination by explaining a suitable example of cobalt amine complex.

b) What is Pearson's HSAB concept? Give the applications of HSAB principle.

c) Discuss the oxidation states of 3d-block elements.

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

a) Give the symbol, name, atomic number and electronic configuration of elements of first transition series. How will you compare first transition series with second and third transition series w.r.to their magnetic behavior and reactivity.

b) Give the postulates of VBT. Explain the formation of $[NiCI_4]^{2-}$ complex ion on the basis of VBT.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE Paper - VI
Software Engineering (22221321)

Day & Date: Sunday, 24-12-2023 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 the correct alternative from the given options. **08**

1) White Box techniques are also classified as _____.
a) Design based testing b) Structural testing
c) Error guessing technique d) None of the mentioned

2) The 'Big picture' diagram of a system is the _____.
a) Logic diagram b) Block diagram
c) System flowchart d) Program flowchart

3) A data dictionary has information about _____.
a) every data element in a data flow
b) only key data element in a data flow
c) only important data elements in a data flow
d) only numeric data elements in a data flow

4) Which of the following gives a logical structure of the database graphically?
a) Entity-relationship diagram b) Architectural representation
c) Database diagram d) None of these

5) Which one of the following is not a phase of Prototyping Model?
a) Quick Design b) Coding
c) Prototype Refinement d) Engineer Product

6) Software Engineering aims at developing?
a) Reliable software
b) Cost effective software
c) Reliable and cost effective software
d) None of these

7) _____ is sometimes referred as 'Bubble Diagram'.
a) Flowchart b) ER – diagram
c) Decision table d) DFD

8) Which two models doesn't allow defining requirements early in the cycle?
a) Waterfall & RAD b) Prototyping & Spiral
c) Prototyping & RAD d) Waterfall & Spiral

Q.2 Write the answers in short. (Any Four) **12**

a) What is flowchart?
b) Define the term Risk.
c) Define Open and Closed system.
d) Write the stages of System Development Life Cycle.
e) Who is 'System Analyst'?
f) What is Decision Tree?

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

a) Differentiate between Physical and Logical DFD.
b) Draw an ER-diagram for College Admission System.
c) What are the rules for constructing the DFD?

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

a) Explain different types of system maintenance.
b) Explain incremental model in detail.
c) What is Data Dictionary? Explain the importance of DD.

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

a) Explain the various Fact-finding techniques in detail.
b) Draw a CLD and First Level DFD for Fixed Deposit System.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - V)
General Physics and Sound (22221304)

Day & Date: Friday, 15-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The gradient of scalar function is _____ rate of change of function in space.
a) minimum b) maximum
c) slow d) constant

2) In general, the motion of gyroscope consists of _____.
a) Rotation, Precession & Nutation
b) Rotation & Precession
c) Rotation only
d) only Precession

3) The rise and fall of axis of rotation of a rotating body is called _____.
a) Precession b) Nutation
c) Rotation d) Vibration

4) Bending moment of beam is _____.
a) Directly proportional to modulus of rigidity
b) Inversely proportional to radius of curvature
c) Directly proportional to radius of curvature
d) Inversely proportional to modulus of rigidity

5) The relation between magnitudes of precessional torque (τ_1), gravitational torque (τ_2) and centripetal torque (τ_3) is _____.
a) $\tau_1 = \tau_2 - \tau_3$ b) $\tau_1 = \tau_2 + \tau_3$
c) $\tau_1 = \tau_3 - \tau_2$ d) $\tau_2 = \tau_1 - \tau_3$

6) If height of liquid in rotation viscometer is increased, the rotation torque will be _____.
a) decreased b) increased
c) same d) no affected

7) Searl's viscometer used to determine the viscosities of _____.
a) low viscous liquid b) highly viscous liquid
c) any liquid d) all of these

8) Decay of sound energy in hall is _____.
a) Linear b) Exponential
c) Constant d) Zero

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

a) What is Precession?
b) What is cantilever?
c) Define Bending moment.
d) What are the applications of Oswald's viscometer?
e) What is scalar triple product?

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

a) Explain vector triple product.
b) Write a note on Gyroscope.
c) What are the requirements of good acoustics?

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

a) Explain the rotating cylinder method of determining the coefficient of viscosity.
b) Explain Sabine's experimental work and obtain expression for reverberation time.
c) Derive the expression of Young's modulus of wire by Searl's method.

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

a) Obtain an expression for angle of lean of the disc and radius of curvature of the path for rolling disc.
b) Define divergence of vector field and give physical significance of divergence of vector.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
BIO-CHEMISTRY (Paper – I)
Biomolecules (22221306)

Day & Date: Tuesday, 26-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Where amino acids are stored in body?
a) stomach b) intestine
c) kidney d) not stored in body

2) Xylose is _____.
a) triose b) tetrose
c) pentose d) hexose

3) Enzymes are polymers of _____.
a) hexose sugar b) amino acids
c) fatty acids d) inorganic phosphates

4) Fats and oils are _____.
a) glycolipids b) triglycerides
c) phospholipids d) conjugated lipids

5) $\alpha\ 1 \rightarrow 4$ glycosidic linkages is present in _____.
a) maltose b) lactose
c) sucrose d) isomaltose

6) In triglycerides, glycerol is linked to fatty acid with _____.
a) ether bond b) ester bond
c) amide bond d) glycosidic bond

7) Enzymes are made up of _____.
a) fats b) proteins
c) nucleic acids d) vitamins

8) Zwitterions are ionised species of _____.
a) acidic amino acids b) basic amino acids
c) neutral amino acids d) all of these

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

a) Define coenzyme and holoenzyme.
b) Write the structures of pyridoxine and thiamine.
c) What is tertiary and quaternary structure of protein?
d) What is ninhydrin reaction?
e) Write the four functions of t-RNA.

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

a) Define lipids. Write structure and functions of triglycerides.
b) Explain the importance of xylose and xylulose.
c) Write note on classification of amino acids.

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

a) Write the classification of enzymes with two examples of each class.
b) Explain Lipid bilayer – Fluid mosaic model of plasma membrane.
c) What are carbohydrates? Classify oligosaccharides with examples.

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

a) Write the structure, biochemical role and deficiency disorder of niacin.
b) What is phosphodiester linkage? Explain the components of nucleic acids.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PLANT PROTECTION (Paper – I)
Major Crops and Methods of Integrated Plant Protection (22221312)

Day & Date: Tuesday, 26-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Heat and solarization is the example of _____ method.
a) physical b) chemical
c) biological d) mechanical

2) The egg masses of _____ are clearly seen on lower surface of leaves.
a) Gross hopper b) Pyrilla
c) Hairy caterpillar d) All of these

3) Jowar belongs to family _____.
a) solanaceae b) liliaceae
c) moraceae d) poaceae

4) The fruit trees like _____ disease branches cut and removed from trees by Rope draging.
a) lemon b) orange
c) apple d) all of these

5) Netting and bagging is the example of _____ method.
a) mechanical b) biological
c) chemical d) physical

6) Sugarcane variety _____ is resistant to the whip smut disease.
a) CO-671 b) CO-167
c) CO-510 d) CO-100

7) Brinjal variety _____ is resistant to stem and fruit borers.
a) Sonalika b) Vaishally
c) Swati d) Kalyansona

8) Rose is the example of _____.
a) Floriculture b) Fruit crop
c) Cash crop d) Pulse crop

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

a) What is plant protection?
b) Define irrigation.
c) Give the definition of farming.
d) Define crop hygiene.
e) What is bagging?
f) Define fungicides.

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

a) Crop rotation
b) Rope dragging
c) Nematicides

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

a) Give the insecticides studied by you.
b) Explain the shaking of plant.
c) Write the origin and morphology of sugarcane.

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

a) Describe the tur with respect of their origin, morphology, harvesting and economic importance.
b) Give the jowar with respect to their origin, morphology, threshing and economic importance.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper – VI)
Electronic Devices and Applications (22221305)

Day & Date: Saturday, 16-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple choice questions **08**

1) The voltage divider bias $Vcc = 25\ V, R_1 = 10\ k\Omega, R_2 = 2.2\ k\Omega, Rc = 3.6\ k\Omega$ and $R_E = 1\ k\Omega$. What is the emitter voltage?
a) 6.7 V b) 4.9 V
c) 5.3 V d) 3.8 V

2) An advantage of RC coupling scheme is the _____.
a) good impedance matching b) economy
c) high efficiency d) none of these

3) In a LC circuit when the capacitor energy is maximum. the inductor energy is _____.
a) Minimum
b) Maximum
c) half-way between maximum and minimum
d) none of these

4) The device that exhibits negative resistance region is _____.
a) diac b) triac
c) transistor d) UJT

5) A half adder can be constructed from a combination of _____.
a) one XOR gate and one OR gate
b) one XOR gate and one AND gate
c) two XOR gates only
d) two AND gates only

6) As compared to voltage regulators made up of discrete components IC regulators have the advantage(s) of _____.
a) self protection against over temperature
b) remote control
c) current limiting
d) all of these

7) In Colpitts oscillator is _____ used.
a) trapped inductor b) trapped capacitor
c) trapped resistor d) None of the above

8) In a p-channel FET, the charge carriers are _____.
a) electrons b) Holes
c) both electrons and holes d) none of these

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

a) Draw the potential divider circuit.
b) What are the types of feedback? state the advantages and disadvantages of each type.
c) Define FET parameters.
d) State De morgans first and second theorem
e) What is voltage regulation?

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

a) Give the comparison between normal amplifier and differential amplifier.
b) Explain the working of the crystal oscillator, state its advantages
c) Draw the block diagram of the CRO and explain the function of each block.

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

a) Draw the circuit diagram of transistor series voltage regulator and explain its working.
b) Write a note on full adder.
c) Explain the principal and operation of the phase shift oscillator.

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

a) Explain the construction, operation and characteristics of the unijunction transistor (UJT).
b) Explain transistor RC coupled amplifier with special reference to frequency response, advantage, disadvantage and applications.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
BIO-CHEMISTRY (Paper – II)
Biochemical Techniques (22221307)

Day & Date: Wednesday, 27-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The information retrieval tool of NCBI GenBank is _____.
a) Entrez b) STAG
c) text search d) seqin

2) Diphenylamine method is used in the quantisation of _____.
a) RNA b) DNA
c) Nucleic acids d) proteins

3) The chromatoplate in TLC is made up of _____.
a) paper b) wood
c) glass d) fibre

4) Electrophoresis is not used in _____.
a) separation of amino acids b) separation of proteins
c) separation of lipids d) separation of nucleic acids

5) BLAST programme is used for _____.
a) translate protein sequence
b) translate DNA database
c) translate input sequence
d) none of these

6) The degree of unsaturation of lipids can be measured as _____.
a) saponification number b) iodine number
c) ester number d) acid number

7) In chromatographic separation, mobile phase cannot be a _____.
a) liquid b) solid
c) gas d) mixture of gases

8) Separation of charged particles using electric field is known as _____.
a) Hydrolysis b) electrophoresis
c) protein synthesis d) protein denaturing

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

a) What is electrophoretic mobility?
b) Write the meaning of molar and specific absorbance.
c) Write three applications of ELISA.
d) Write important applications of agarose gel electrophoresis.
e) Which are the information sources of bioinformatics?

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

a) Write the technique of Polyacrylamide gel electrophoresis.
b) Explain DPA method for nucleic acids.
c) Explain principle and technique of thin layer chromatography.

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

a) Define chromatography and note on its classification.
b) Explain saponification value and ester value for lipids.
c) Write note on OMIM and PubMed retrieval tools.

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

a) What is transmittance and absorbance? Explain in detail spectrophotometer.
b) What is PCR? Explain technique and applications of PCR.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
PLANT PROTECTION (Paper – II)
Crop Diseases and Their Management (22221313)

Day & Date: Wednesday, 27-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) It is an ability of pathogen to cause disease in host plants is known as _____.
a) pathogenecity b) pathogenesis
c) parasite d) saprophyte

2) Little leaf of brinjal is the example of _____ disease.
a) fungal b) bacterial
c) viral d) phytoplasma

3) _____ pathology is a branch of botany which deals with the different types of diseasal plants.
a) Plant b) Animal
c) Both a and b d) None of these

4) Process in which a chain of events take place which leads to disease is called as _____.
a) symptoms b) etiology
c) pathogenesis d) pathogenecity

5) On the basis of pathogen of causal agents the plant disease grouped into _____.
a) six b) five
c) four d) three

6) The _____ involves the survival and multiplication of the organism.
a) incubation b) inoculation
c) isolation d) all of these

7) _____ factors are known to influence the plant growth.
a) Agronomic b) Climatic
c) Nutritional d) all the above

8) Living organism causing diseae in the host plant is called as _____.
a) host b) pathogen
c) pathogenecity d) pathogenesis

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

a) What is host?
b) Define susceptibility.
c) Give the definition of inoculation.
d) Define isolation.
e) What is symptoms?
f) Give the two symptoms of rust of soyabean.

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

a) Concept of plant disease.
b) Soil borne pathogen.
c) Koch's postulates.

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

a) Explain the classification of plant disease based symptoms.
b) Write the incubation studied by you.
c) Describe the symptoms and control measures of yellow vein mosaic of bhendi.

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

a) Describe the symptoms, causal organism, disease cycle and control measures of citrus canker.
b) Explain the qualitative method studied by you.

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Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - V)
Probability Distributions (22221308)

Day & Date: Sunday, 17-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The joint p. m. f. of a bivariate r. v. (X, Y) is
$P(x, y) = k(x + y); x = 1, 2,\ y = 1, 2$
Then the value of k is _____.

a) $\frac{1}{6}$ b) $\frac{1}{9}$

c) $\frac{1}{4}$ d) $\frac{1}{12}$

2) If X and Y are two independent r.v.s then $V(X - Y)$ = _____.

a) $V(X) + V(Y) - 2Cov(X, Y)$ b) $V(X) + V(Y) + 2Cov\,(X, Y)$

c) $V(X) + V(Y)$ d) $V(X) - V(Y)$

3) Which of the following is not a p. d. f.?

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

c) $f(x) = \begin{cases} \sin x & ; \quad 0 < x < \frac{\pi}{2} \\ 0 & ; \quad \text{otherwise} \end{cases}$ d) $f(x) = \begin{cases} 1 & ; \quad 0 < x < 1 \\ 0 & ; \quad \text{otherwise} \end{cases}$

4) The probability density function (p.d.f) of r.v. X is given by
$f(x) = \begin{cases} k(x+1) & ; \quad 2 < x < 4 \\ 0 & ; \quad \text{otherwise} \end{cases}$ then the value of k is _____.

a) 8 b) $\frac{1}{8}$

c) 1 d) 3

5) If m.g.f. of X is $M_x(t) = (1 - \theta t)^{-n}$ then what is second raw moment of X?

a) $n(n+1)\theta^2$ b) $\frac{n(n+1)}{\theta^2}$

c) $\left(\frac{n+1}{\theta}\right)^2$ d) $n\theta$

6) If (X, Y) is a bivariate r.v. with joint p.d.f.
$f(x, y) = \begin{cases} 4xy & ; \quad 0 < x, y < 1 \\ 0 & ; \quad \text{otherwise} \end{cases}$
Then marginal p.d.f. of the r.v. Y is given by _____.

a) $2x$ b) $2y$

c) $3x$ d) $3y$

7) Which of the following statement is always true with respect to bivariate r. v. (X, Y)?

a) $f_{x,y}(x, y) = f_x(x) \times f_y(y)$ for all x, y

b) $E(XY) = E(X).E(Y)$

c) $E(X + Y) = E(X) + E(Y)$

d) $E(X \mid Y)$ is a function of Y

8) A r.v. X has probability density function

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

What is the value of $P(X \le 1)$?

a) $\frac{1}{2}$ b) 1

c) $\frac{1}{4}$ d) $\frac{1}{6}$

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

a) Define marginal probability distribution of X, when (X, Y) be a two dimensional discrete random variable.

b) Let (X, Y) be a two dimensional discrete random variable. Define conditional expectation of X given $Y = y$

c) Let X be a continuous r. v., define harmonic mean.

d) Define joint probability density function of continuous r. v. (X, Y).

e) Define covariance in case of continuous random variable (X, Y).

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

a) Let (X, Y) be two dimensional discrete random variable, state and prove addition theorem on expectation.

b) Consider the probability density function of X is

$$f(x) = \begin{cases} c(2x - x^2) & ; \ 0 < x < \frac{5}{2} \\ 0 & ; \ \text{otherwise} \end{cases}$$

Find

1) The value of c

2) Mean of X

c) The joint density function of X and Y is

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

Are X and Y independent?

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

a) The joint probability distribution of (X, Y) is

$$p(x, y) = \begin{cases} \frac{2x + 3y}{2} & ; \quad x = 0,1,2, y = 1,2,3 \\ 0 & ; \quad \text{otherwise} \end{cases}$$

Find Marginal probability distribution of X and Y.

b) State the any four properties of cumulative distribution function.

c) Two random variable X and y have a joint probability density function.

$$f(x, y) = \begin{cases} \frac{5}{16} x^2 y & , 0 < y < x < 2 \\ 0 & , \ \text{otherwise} \end{cases}$$

Find the marginal density function of X and Y

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

a) If the probability density function of a continuous random variable X is given by

$$f(x) = \begin{cases} ax & ; \quad 0 \le x \le 1 \\ a & ; \quad 1 \le x \le 2 \\ 3a - ax & ; \quad 2 \le x \le 3 \\ 0 & ; \quad \text{eslewere} \end{cases}$$

Find

1) The value of a
2) Mean of X
3) Variance of X

b) The random variable X and Y have a joint density function given by

$$f(x,y) = \begin{cases} \dfrac{2e^{-2x}}{x} & ; \quad 0 \le x < \infty \;\; 0 \le y \le x \\ 0 & ; \quad \text{otherwise} \end{cases}$$

Compute $Cov(X,Y)$.

SLR-DA-87

Seat No.		Set	P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
METEOROLOGY (Paper – I)
Climatology (22221326)

Day & Date: Thursday, 28-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) An _____ is an immense body of air.
a) Front b) air mass
c) frontolysis d) humidity

2) _____ Winds are called as primary circulation.
a) Local b) Seasonal
c) Regional d) Planetary

3) Ozone occupies _____ % gaseous in the atmosphere.
a) 0.06 b) 12
c) 0.03 d) 0.00006

4) The coriolis force is _____ in high latitudes.
a) strongest b) weak
c) strong d) absent

5) _____ Latitudes called as horse latitude.
a) 10° to 20° b) 15° to 25°
c) 20° to 30° d) 25° to 35°

6) The line of equal surface pressure of atmosphere is called as _____.
a) isotherm b) isohytes
c) isohaline d) isobar

7) Typhoon cyclone exists in _____.
a) Japan b) China
c) Australia d) USA

8) Tamil Nadu receives rainfall during winter due to _____.
a) monsoon b) advancing monsoon
c) seasonal d) retreat monsoon

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

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

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

a) Composition of the atmosphere.
b) Explain branches of Climatology.
c) Sources region of air masses

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

a) Explain the life cycle of cyclone.
b) Discuss on Climatic records and statistics.
c) Discuss on upper air circulation pattern.

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

a) Explain the planetary wind system.
b) Give an account of North eastern monsoon in India.

SLR-DA-88

Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
GEO-CHEMISTRY (Paper – I)
Introduction to Geochemistry (22221328)

Day & Date: Thursday, 28-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The IUPAC name of $H - C \equiv C - H$ is _____.
a) ethane b) ethene
c) ethyne d) propyne

2) The value of radius ratio of 0.5248 corresponds to _____ structure.
a) octahedral b) tetrahedral
c) cubic d) planar

3) At _____ point all the three phases of a system exists.
a) triple point b) sublimation
c) vapour d) eutectic

4) For water system, the number of phases at the triple point is _____.
a) 0 b) 1
c) 2 d) 3

5) Stable phase diagram occurs at _____ condition.
a) solid + liquid b) solid + vapour
c) liquid + vapour d) liquid + liquid

6) The number of phase lines observed for the phase diagram of Sulphur is _____.
a) 3 b) 4
c) 5 d) 6

7) Clay minerals are _____ in nature.
a) colloids b) solids
c) liquids d) gaseous

8) Co-ordination number of bcc unit cell is _____.
a) 4 b) 6
c) 8 d) 2

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

a) Define empirical formula.
b) Define coordination number.
c) Define colloids.
d) Define aromatic compounds with one example.
e) Write two examples of alicyclic compounds.

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

a) Explain water system for phase rule in detail.

b) Write homologues series of alkenes up to eight carbon atoms. Write structures of 1- propene and 2- butene.

c) Explain structure of Sodium Chloride.

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

a) An organic compound contains 32% carbon. 4% hydrogen and remaining oxygen. Calculate its empirical formula.

b) Explain True equilibrium and metastable equilibrium with example.

c) Write two mechanical and two optical properties of colloids.

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

a) Write note on geological evidences of silica minerals. Explain kinds of colloidal system.

b) Write note on radii of common ions in rock forming minerals. Explain structure of Cesium chloride.

SLR-DA-89

Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper – V)
Cell Biology (22221322)

Day & Date: Thursday, 28-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) In prokaryotic cells, ribosomes are _____.
a) 70 S b) 80 S
c) 60 S + 40 S d) 50 S + 40 S

2) Plasma membrane is made up of _____.
a) Chitin b) Lipid and Protein
c) Cellulose d) Keratin

3) Smooth endoplasmic reticulum produces _____.
a) Nuclei acid b) Carbohydrate
c) Protein d) Lipid

4) _____ is the power house of cell.
a) Plasma membrane b) E.R
c) Mitochondrion d) Golgi complex

5) Microfilaments are composed of _____.
a) Mosaic protein b) Tubulin protein
c) Chitin protein d) Actin protein

6) Ribosomes are produced and assembled in _____.
a) Nucleolus b) Mitochondria
c) Cytoplasm d) Golgi apparatus

7) Who was the first person to observe the chromosomes?
a) Fleming b) Waldeyer
c) Hofmeister d) Strasburger

8) The meiotic division takes place in _____.
a) Meristematic cells b) Reproductive cells
c) Conductive cells d) vegetative cells

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

a) Virus
b) Uniport
c) Lysosomes
d) Semi-autonomous nature of mitochondria
e) Microtubules

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

a) Explain ultra-structure and functions of Golgi apparatus.
b) Describe ultra-structure and functions of Mitochondrion.
c) Explain eukaryotic cell.

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

a) Describe structure and function of nucleus.
b) Explain structure of RER.
c) Describe Fluid Mosaic Model of plasma membrane.

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

a) Describe mitosis and give its functions.
b) Explain chromosome and types of chromosomes.

SLR-DA-90

Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper – VI)
Statistical Methods-I (22221309)

Day & Date: Monday,18-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The disadvantage of C.B.R. is _____.
   a) It ignores age and sex distribution
   b) It underestimates fertility rale
   c) It provides very approximate fertility rate
   d) All the above

2) In trivariate study the correlation between two variables when the third variable held constant is called as _____.
   a) Simple correlation b) Partial correlation
   c) Multiple correlation d) Multiple regression

3) Probability of including a specified unit in a sample of size n selected out of N units is _____.
   a) $\frac{1}{N}$ b) $\frac{n}{N}$
   c) $\frac{1}{N-1}$ d) $\frac{1}{n}$

4) The number of possible samples of size n from a population of N units by using SRSWR is _____.
   a) N^n b) N^2
   c) $N!$ d) None of these

5) Which one of the following rate is obtained for a segment of a population?
   a) Crude death rate b) Standardised death rate
   c) Vital index d) Specific death rate

6) The partial correlation lies between _____.
   a) $-1\ to\ 1$ b) $0\ to\ 1$
   c) $-\infty\ to\ \infty$ d) $0\ to\ \infty$

7) In case of SRSWOR of size 10 with population size 50, probability of selecting unit no. 5 at 3rd draw is _____.
   a) $\frac{1}{5}$ b) $\frac{1}{50}$
   c) $\frac{1}{10}$ d) $\frac{1}{48}$

8) IF N.R.R. < 1 then we interpret that _____.
   a) increase in population b) reduction in population
   c) constancy in population d) All the above

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

a) Define C.B.R.
b) Define Census and sample.
c) Define multiple correlation.
d) Explain how S.D.R. is superior to C.D.R.
e) State variance of sample mean in case of SRSWR.

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

a) Describe indirect method of obtaining S.T.D.R.
b) State and prove any two properties of residuals.
c) Explain SRSWR and SRSWOR.

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

a) Find $R_{1.23}$ if $r_{12} = 0.6$, $r_{13.2} = 0.4$.
b) Show that sample mean is unbiased estimate of population mean in case of SRSWOR.
c) Define G.R.R. and N.R.R. and also state limitations of G.R.R.

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

a) Define multiple correlation coefficient and derive the formula for multiple correlation coefficient.
b) With usual notations, prow that

$$var(\bar{y}_n)_{wor} \frac{N-n}{Nn} S^2$$

SLR-DA-91

Seat No.		Set	P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
METEOROLOGY (Paper-II)
General Meteorology (22221327)

Day & Date: Friday, 29-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The atmospheric air is held to the Earth by: _____.
a) Gravity b) Winds
c) Clouds d) Rotation of the Earth

2) The _____ envelope surrounding the earth is known as atmosphere.
a) gaseous b) weather
c) climate d) environment

3) In stratosphere, maximum density of ozone is found at about _____ kilometres.
a) 10 b) 50
c) 15 d) 25

4) The frame of reference associated with a non-rotating body is _____.
a) unaccelerated b) accelerated
c) steady d) rotating

5) Which of the following equation is incorrect?
a) Centrifugal force = $-mr\omega^2$
b) $-2m(\vec{\omega} \times \vec{r}) = -2m\omega V \sin\phi$
c) Angular velocity = $\frac{mv^2}{r}$
d) Centrifugal force = $-m\vec{\omega} \times (\vec{\omega} \times \vec{r})$

6) Which of the following is the correct expression for work?
a) $W = \vec{F} \times \vec{S}$ b) $W = \vec{F} \cdot \vec{S}$
c) $W = \vec{r} \times \vec{F}$ d) $W = -(\vec{F} \times \vec{S})$

7) To get n-type semiconductor pure silicon is doped with _____ impurity.
a) divalent b) trivalent
c) tetravalent d) pentavalent

8) A typical output of a solar cell V=0.4 volts and I = 15 mA. Its output power is _____ mW.
a) 6.0 b) 15.4
c) 14.85 d) 37.5

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

a) Two kilogram of ice melts. Calculate the amount of heat energy (in calories) it absorbs.
b) What are the reactive halogen gases that destroy stratospheric ozone?
c) Calculate Cariolis parameter in rad/s, at latitude 20 degree.
d) Why winds flow?
e) What is energy chain?

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

a) Explain the formation of SMOG. What are its adverse effects.
b) State and explain Buys-Ballot's law.
c) Discuss interrelation between energy, man, and environment.

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

a) Explain greenhouse effect.
b) What is pressure gradient force?
c) What is a polar orbiting satellite?

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

a) Explain reflection and absorption of solar radiations in the Earth's atmosphere.
b) How the depletion of ozone layer in the stratosphere occurs?

SLR-DA-92

Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
GEO-CHEMISTRY (Paper – II)
Introduction to Solar System and Geo-Sphers (22221329)

Day & Date: Friday, 29-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Elements which readily-form ions with an outermost 8-electron shell are:
   a) Siderophile b) Chalcophile
   c) Lithophile d) Atmosphere

2) Among the chemical elements, the most abundant chemical element in the earth's crust is _____.
   a) Silicon b) Oxygen
   c) Iron d) Aluminium

3) Who introduced the term siderophile, chalcophile, lithophile, and atmophile?
   a) Goldschmidt (1923) b) Clarke (1924)
   c) Ringwood (1975) d) Cameron (1737)

4) Which one of the following are aerolites?
   a) Iron meteorites b) Iron-stony meteorites
   c) Stony meteorites d) Metallic meteorites

5) Resembling of Tektites is:
   a) The Obsidian b) The basalt
   c) The rhyolites d) The granodiorite

6) According to the cosmic abundance which of the following element is abundant.
   a) Iron b) Carbon
   c) Silicon d) Hydrogen

7) The hydrosphere is the:
   a) Continuous shell of water b) Discontinuous shell of water
   c) Uniform shell of water d) None of these

8) Which planets revolve around the sun in retrograde rotation?
   a) Uranus and Venus b) Earth and Mars
   c) Neptune and Pluto d) Mercury and Jupiter

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

a) Define transitional zone of Earth.
b) Name any two types of meteorites.
c) What is the average composition of Terrestrial water?
d) Names of variable constituents of the atmosphere.
e) Which element having affinity towards metallic iron?

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

a) Cosmic abundance of elements.
b) Zonal structure of the earth.
c) Atmospheric addition and losses during geologic time.

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

a) Describe the structure of the atmosphere.
b) Discuss in brief the geochemical classification of elements.
c) Explain the composition of planets.

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

a) Define meteorite. Explain the classification of Meteorites.
b) Describe the nature of hydrosphere with composition of sea water. Add the note on gains and losses of elements in the oceanic water.

SLR-DA-93

Seat No.		Set	P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper–VI)
Principles of Ecology (22221323)

Day & Date: Friday, 29-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The study of interactions between living organisms and the environment is called as _____.
a) Ecology b) ecosystem
c) phytogeography d) phytosociology

2) An association between two individuals where both are benefit is called _____.
a) competition b) commensalism
c) mutualism d) parasitism

3) Which one of the following is an abiotic factor?
a) Animal b) plants
c) humidity d) fungi

4) In ecological succession the final developmental phase is known as _____.
a) Ecesis b) climax
c) nudation d) sere

5) Which is the largest ecosystem on earth?
a) Ocean b) desert
c) forest d) grassland

6) Is one of the most prevalent hotspots of biodiversity in India?
a) Himalaya b) Western Ghats
c) Eastern Ghats d) Southern Ghats

7) _____ is present in the first tropic level in the food chain.
a) Tertiary consumer b) Secondary consumer
c) Primary consumer d) Autotrophs

8) Why is the biological wealth of our planet declining rapidly?
a) Animal activities b) Plant activities
c) Ecological activities d) Human activities

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

a) Ecology
b) Natality
c) Commensalism
d) Water – abiotic factor
e) Species dominance

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

1) Explain grassland ecosystem.
2) Describe ammensalism and commensalism.
3) Explain lentic freshwater ecosystem.

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

1) Explain components of community.
2) Describe ecological pyramid of energy.
3) Explain desert ecosystem.

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

1) Explain maraine water ecosystem on the basis of depth and light penetration.
2) Describe types of biodiversity and give importance of biodiversity.

SLR-DA-94

Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - V)
Differential Calculus (22221316)

Day & Date: Tuesday, 19-12-2023 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 the correct alternative for each of the following. **08**

1) Angle θ between tangent and radius vector is given by _____.

a) $\tan\phi = \frac{1}{r}\frac{d\theta}{dr}$ b) $\tan\phi = \frac{1}{r}\frac{dr}{d\theta}$

c) $\tan\phi = r\frac{dr}{d\theta}$ d) $\tan\phi = r\frac{d\theta}{dr}$

2) Pedal equation of curve $r^n = a^n \sin n\theta$ is _____.

a) $p = r$ b) $p = r\sin\theta$

c) $p = r\sin n\,\theta$ d) $p = r\cos n\,\theta$

3) Radius of curvature of any point (s, ψ) on curve $s = 4a\sin\psi$ is _____

a) $4a\cos\psi$ b) $4a\sin\psi$

c) $4a\sin 2\psi$ d) $4a\cos 2\psi$

4) The pedal formula for the radius of curvature is _____.

a) $\varrho = r + \frac{dr}{dp}$ b) $\varrho = r\frac{dp}{dr}$

c) $\varrho = r\frac{dr}{dp}$ d) $\varrho = r + \frac{dp}{dr}$

5) If u, v, w are function of x, y, z then Jacobian of u, v, w with respect to x, y, z is determinant of order _____.

a) 1 b) 2

c) 3 d) n

6) If $u = x^2 - y^2, v = xy$ then $\frac{\partial(uv)}{\partial(x,y)}$= _____.

a) $x^2 + y^2$ b) $2(x^2 + y^2)$

c) $x + y$ d) $2(x + y)$

7) A function $f(x, y)$ is minimum at point (a, b) if _____.

a) $AC - B^2 > 0, A > 0$ b) $AC - B^2 > 0, A < 0$

c) $AC - B^2 < 0, A > 0$ d) $AC - B^2 < 0, A < 0$

8) The maximum value of $\sin x + \cos x$ is _____.

a) 2 b) 1

c) $\sqrt{2}$ d) 3

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

a) Prove that for the curve $y = be^{x/a}$ the length of subtangent is constant and length sub normal is y^2/a

b) Show that for the catenary $s = c\tan\psi$ the radius of curvature at any point is $\varrho = c + s^2/c$

c) If $x = r\cos\theta\,,\ y = r\sin\theta$ then find $\frac{\partial(x,y)}{\partial(r\theta)}$

d) Show that the function
$u = x + y - z,\ v = x - y + z,\ w = x^2 + y^2 + z^2 - 2yz$
are dependent to each other.

e) Find maximum and minimum value of the polynomial function f given by $f(x) = 8x^5 - 15x^4 + 10x^2$

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

a) Find equation of tangent and normal at (a, a) to the curve $x^2y^3 = a^5$

b) Find radius of curvature for the curve $r = a(1 - \cos\theta)$

c) If $u = \frac{x_2x_3}{x_1}\quad u_2 = \frac{x_1x_3}{x_2}\quad u_3 = \frac{x_1x_2}{x_3}$ then prove that $\frac{\partial(u_1,u_2,u_3)}{\partial(x_1,x_2,x_3)} = 4$

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

a) Find polar subtangent and subnormal for $r = ae^{\theta\cos\alpha}$

b) Find radius of curvature of the parabola.
$x = at^2\quad y = 2at$ at 't'

c) Explain Lagrange's method of undetermined multiplier to find extreme value of $u = f(x, y)$ subject to condition $\phi(x, y) = 0$

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

a) If $y = f(x)$ be equation of curve in cartesian form then show that the radius of curvature $\varrho = \frac{[1+(dy/dx)^2]^{3/2}}{\frac{d^2y}{dx^2}}$ and also find radius of curvature at any point on the curve $y = c.\cosh(x/c)$

b) If J denotes the Jacobian of u, v, w with respect to x, y, z and J' denotes the Jacobian of x, y, z with respect to u, v, w then prove that $JJ' = \perp$

SLR-DA-95

Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper – V)
Plant Anatomy (22221302)

Day & Date: Saturday, 30-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Rewrite the following sentences by choosing correct alternative. **08**

1) The mechanical tissue of plants is _____.
a) Parenchyma b) Sclerenchyma
c) Phloem d) Vessels

2) The living tissue of xylem is _____.
a) Tracheids b) Xylem fibres
c) Xylem parenchyma d) sieve tubes

3) All tissues interior to the endodermis are collectively called _____.
a) Pith b) Pericycle
c) Stele d) Central core

4) Another term can also be used for a meristematic cell is _____.
a) Fiber b) Primordia
c) Initial d) Ray

5) The light yellow coloured wood developed in tree trunk is called as _____.
a) Heart wood b) Autmn wood
c) Sap wood d) Spring wood

6) When vessels are absent in wood the wood is called as _____.
a) Porus wood b) Ring porus wood
c) Non porus wood d) Diffuse porus wood

7) Lenticels are produced in _____.
a) Periderm b) Cork
c) Phellogen d) Dermatogen

8) The vascular bundles forming a ring are present in _____.
a) Dicot b) Monocot
c) Gymnosperms d) Pteridophytes

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

a) Enlist the type of meristem based on plane of division.
b) What is the function of stomata.
c) Define anamolous secondary growth.
d) Enlist the type of wood based on vessel elements.
e) Give the function of collenchyma.

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

a) Tunica corpus theory.
b) Tylosis.
c) Sclerenchyma tissue.

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

a) Describe the distribution of mechanical tissue in plants.
b) Describe the structure of periderm.
c) Describe the primary structure of monocot stem.

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

a) Describe the anamolous secondary growth in Dracena stem.
b) Describe the types of wood with suitable diagram.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - VI)
Laplace Transform (22221317)

Day & Date: Wednesday, 20-12-2023 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 the correct alternative for each of the following. **08**

1) If $L\{F(t)\} = f(p)$ then $L\{e^{-at}F(t)\} =$ _____.

a) $\frac{1}{a}f\left(\frac{p}{a}\right)$ b) $f\left(\frac{p}{a}\right)$

c) $f(p+a)$ d) $f(p-a)$

2) Find $L\{\cosh at\}$ = _____.

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

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

3) Find $L\{F''(t)\}$ = _____.

a) $p^2L\{F(t)\} - pf'(0) - f(0)$ b) $p^2L\{F(t)\} - pf(0) - F'(0)$

c) $pL\{F(t)\} - pf'(0) - f(0)$ d) $pL\{F(t)\} - F'(0) - pF(0)$

4) Find $L^{-1}\left\{\frac{1}{p^2-6p+10}\right\}$ = _____.

a) $e^{3t}\sin t$ b) $e^{-3t}\sin t$

c) $e^{3t}\cos t$ d) $e^{-3t}\cos t$

5) Find $L^{-1}\left\{\frac{1}{\sqrt{p}}\right\}$ = _____.

a) $\frac{\sqrt{t}}{\sqrt{\pi}}$ b) $\frac{1}{\sqrt{\pi t}}$

c) $\frac{\sqrt{\pi}}{\sqrt{t}}$ d) $\frac{1}{\pi t}$

6) Find $L^{-1}\left\{\frac{1}{(p+a)^n}\right\}$ = _____.

a) $e^{at}\frac{t^n}{(n-1)!}$ b) $e^{-at}\frac{t^n}{(n-1)!}$

c) $e^{-at}\frac{t^{n-1}}{(n-1)!}$ d) $e^{at}\frac{t^{n-1}}{(n-1)!}$

7) If $\frac{d^2y}{dx^2} + y = 0$ under the condition $y = 1, \frac{dy}{dt} = 0$, when $t = 0$ Find $L\{y\}$ = _____

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

c) $\frac{p}{p^2-1}$ d) $\frac{1}{p^2-1}$

8) If $y(x,t)$ is a function of x and t then $L\left\{\frac{\partial y}{\partial x}\right\}$ = _____ where $L\{y(x,t)\} = \bar{y}(x,p)$

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

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

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

a) If $L\{F(t)\} = f(p)$ then prove that $L\{F(at)\} = \frac{1}{a} f\left(\frac{p}{a}\right)$

b) Find $L\{\sin at - at\cos at\}$

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

d) Find $L^{-1}\left\{\frac{5}{p^2} + \left(\frac{\sqrt{p}-1}{p}\right)^2 - \frac{7}{3p+2}\right\}$

e) Evaluate $L^{-1}\left\{\frac{3p-2}{p^2-4p+20}\right\}$

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

a) If $L^{-1}\{f(p)\} = F(t)$ then $L^{-1}\{e^{-ap}f(p)\}$ where $G(t) = F(t-a)H(t-a)$ i.e.

$$G(t) = \begin{cases} F(t-a) & , \quad t > a \\ 0 & , \quad t < a \end{cases}$$

b) Let $F(t)$ be continuous for all $t \geq 0$ and be of exponential order as $t \to \infty$ and if $F'(t)$ is of class A, then $\lim_{t\to\infty} F(t) = \lim_{p\to 0} p\, L\{F(t)\}$

c) Solve $(D^2 + 2D + 1)y = 3\,te^{-t}, t > 0$
subject to the condition $y = 4, Dy = 2$ when $t = 0$

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

a) Prove that $L\left\{\frac{\sin t}{t}\right\} = \tan^{-1}\frac{1}{p}$ and hence find $L\left\{\frac{\sin at}{t}\right\}$

b) Find $L^{-1}\left\{\frac{3p+7}{p^2-2p-3}\right\}$

c) Solve $[tD^2 + (1-2t)D - 2]y = 0$ if $y(0) = 1, y'(0) = 2$

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

a) State and prove Convolution theorem.

b) Solve

i) $(D^2 - 2D + 2)y = 0,\ y = Dy = 1$ when $t = 0$

ii) Find $L\{F(t)\}$ where

$$F(t) = \begin{cases} 0 & 0 < t < 1 \\ t & 1 < t < 2 \\ 0 & t > 2 \end{cases}$$

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper - VI)
Plant metabolism (22221303)

Day & Date: Sunday, 31-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Rewrite the sentence by using correct alternative. **08**

1) The term enzyme was derived from the Greek word by Wilhelm Kuhne in _____.
a) 1877 b) 1888
c) 1899 d) 1866

2) The enzymes are _____ in nature and act as biological catalysts.
a) Starch b) Protein
c) Lipid d) Vitamins

3) Cytokinin discovered by _____ scientist.
a) F. Skoog b) E.O. Miller
c) both a and b d) none of these

4) The example of macronutrient are _____.
a) Nitrogen b) Phosphorus
c) Potassium d) all of these

5) _____ element is not a micronutrient.
a) H b) Cu
c) Zn d) Fe

6) The symbiotic nitrogen fixers convert nitrogen directly into _____.
a) ammonia b) chlorine
c) phosphorus d) all of these

7) Biological nitrogen fixation is mainly divided into _____ types.
a) four b) three
c) six d) two

8) _____ in 1959 proposed the term isoenzyme.
a) Haberland b) Miller
c) Moller d) Ziller

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

a) Define nutrition.
b) Give the definition of enzyme.
c) Define growth.
d) What is nitrogen metabolism.
e) Define symbiotic.
f) Write the two example of nitrogen fixation.

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

a) Coenzyme
b) Deficiency symptoms of nitrogen.
c) Properties of monosaccharide.

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

a) Explain the general character of enzymes.
b) Give the nitrogen cycle studied by you.
c) Describe the Properties of Gibberellins.

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

a) Describe the structure and properties of polysaccharides.
b) Explain the role and deficiency symptoms of phosphours.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS Paper – V
Electronic Circuits (22221318)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) In Wein bridge oscillator expression for frequency of oscillation is _____.
   a) $f = \frac{1}{2\,\pi\sqrt{10}\,R\,C}$ b) $f = \frac{1}{2\,\pi\,R\,C}$
   c) $f = \frac{1}{2\,\pi\sqrt{6}\,R\,C}$ d) $f = \frac{1}{2\pi\sqrt{RC}}$

2) The emitter follower is an example of _____ feedback.
   a) Voltage series b) Voltage shunt
   c) Current series d) Current shunt

3) The gain of the cascade amplifier is equal to the _____.
   a) Division of individual gains b) Sum of individual gains
   c) Difference of individuals gains d) Product of individual gains

4) The point of intersection of dc and ac load lines represents _____.
   a) Operation point b) Current gain
   c) Voltage gain d) Cut of point

5) Transformer utilization factor of the bridge rectifier is _____%.
   a) 28.7 b) 69.3
   c) 81.2 d) 121

6) The process of remove the unwanted ac component in the dc signal is ____.
   a) Rectification b) Amplification
   c) Regulation d) Titrations

7) The dc load line of a transistor circuit is _____.
   a) Plot of gain and frequency
   b) Plot of O/P current and V_{CE} voltage
   c) Plot of O/P and I/P currents
   d) Plot of I/P current and I/P voltage

8) In Class-A power amplifier the transistor conducts for _____.
   a) 90° b) 180°
   c) 360° d) less than 180°

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

a) Draw the circuit diagram of Zener voltage regulator.
b) Enlist different methods of transistor biasing
c) Draw the neat circuit diagram of FET as CS amplifier.
d) What is mean by feedback? Give their types.
e) What is Barkhausen criterion for sustained oscillations in the tank circuit?

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

a) With neat diagram explain working of TC coupled amplifier.
b) Derive the expression for gain of the amplifier with negative feedback.
c) In a Colpitt's oscillator C_1= 200 pF and C_2= 50 pF. Calculate the value of Inductance L for producing oscillations at 1MHz.

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

a) Explain the basic action of transistor as an amplifier.
b) Explain construction and working of centre tapped full wave rectifier.
c) Compare Class-A, Class-B and Class-C power amplifiers.

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

a) What is mean by transistor biasing? Explain potential divider bias. Derive an expression for stability factor.
b) Explain the working of TC coupled Class-B push pull power amplifier. State its advantages and disadvantages.

SLR-DA-99

Seat No.		Set	P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper – V)
Climatology (22221324)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat diagrams & 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 study of climate and how it changes over time.
   a) Climatology b) Geomorphology
   c) Oceanography d) Geology

2) Earth's atmosphere is composed of about _____ percent nitrogen.
   a) 78 b) 68
   c) 86 d) 58

3) _____ is considered as the lowest layer of Earth’s atmosphere.
   a) Stratosphere b) Exosphere
   c) Troposphere d) None of these

4) ITCZ stand for _____.
   a) Inter-Tropical Convergence Zone
   b) Inter- sub Tropical Convergence Zone
   c) Inter-Polar Convergence Zone
   d) None of these

5) The term "Monsoon" is derived from the _____ word "Mausim" which means seasons.
   a) Greek b) Roman
   c) Arabic d) Australian

6) _____ is a perfect balance between incoming heat (insolation) absorbed by the earth and outgoing heat (terrestrial radiation) escaping it in the form of radiation.
   a) Heat budget b) Insolation
   c) Jet streme d) Cyclone

7) Insolation is affected by _____.
   a) The solar constant b) The angle of incidence
   c) The distance from the Sun d) All of these

8) _____ are fast flowing, narrow, meandering air currents in the atmospheres of the Earth.
   a) Insolation b) Heat budget
   c) Jet streams d) None of these

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

a) Write the elements of climate?
b) In which gases play important role in the atmosphere?
c) Definition of Cimatology?
d) Define the air pressure?
e) What is doldrum?

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

a) Heat budget.
b) Planetary wind.
c) Jet stream.

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

a) Explain the distribution of Insolation.
b) Describe the factors affecting on winds.
c) Describe the process of monsoon.

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

a) Explain the structure of atmosphere.
b) Explain the Horizontal Distribution of temperature.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper – V)
MINERALOGY (22221310)

Day & Date: Monday, 01-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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) Which of the following mineral shows twinkling?
   a) Garnet b) Quartz
   c) Olivine d) Calcite

2) Chemical composition of Calcite is _____.
   a) Al_2O_3 b) $CaCO_3$
   c) Fe_2O_3 d) None of these

3) Which of the following terms are used for relief in minerals?
   a) High b) Moderate
   c) Low d) All of these

4) Amethyst, Agate and Opal are verities of _____.
   a) Silica b) Mica
   c) Olivine d) Garnet

5) Which of the following mineral is not Anisotropic nature?
   a) Garnet b) Biotite
   c) Muscovite d) Olivine

6) Repeated twinning is shown by _____.
   a) Orthoclase b) Plagioclase
   c) Microcline d) Calcite

7) Asbestos mineral shows _____ luster.
   a) Pearly b) Adamantine
   c) Silky d) Vitreous

8) Augite belongs to _____ group.
   a) Pyroxene b) Mica
   c) Felspathoid d) Amphibole

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

a) Give two names of Feldspar group minerals.
b) Define Mineral.
c) Give the names of Nicol prisms in petrological microscope.
d) Define Isomorphism.
e) What is Polarized light?

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

a) Pleochroism.
b) Physical and Chemical properties of Hornblende.
c) Types of lusters.

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

a) Explain Moh's Scale of Hardness.

b) Describe Isotropism with example.

c) Explain Cleavage in minerals with examples.

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

a) Describe Physical properties, chemical composition, Occurrence of Orthoclase and Microcline.

b) Describe Physical properties, chemical composition, Occurrence of Muscovite and Biotite.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper – V)
Bacterial Cytology, Physiology and Metabolism (22221314)

Day & Date: Monday, 01-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) _____ is an example of thermophile.
a) *Bacillus* b) *Thermus aquatics*
c) *E.coli* d) *Clostridium titani*

2) The enzymes of _____ class are responsible for breakdown of bonds.
a) Transferases b) Oxidoreductases
c) Lyases d) Ligases

3) Transport of solutes with chemical modification is called _____.
a) Active transport b) Passive transport
c) Simple diffusion d) Group translocation

4) _____ is responsible for giving resistance to the endospore.
a) Dipicolinic acid b) Peptidoglycan
c) Diaminopimelic acid d) Ribosome

5) Bacteria with cluster of polar flagella is called as _____.
a) Lophotrichous b) Monotrichous
c) Amphitrichous d) Peritrichous

6) In Gram negative bacteria inner layer of cell wall is made up of _____.
a) Protein b) Phospholipid
c) Peptidoglycan d) Lipopolysaccharide

7) Swelling of cell due to hypotonic solution is known as _____.
a) Plasmolysis b) Plasmoptysis
c) Shrinking d) Bursting

8) The magnetosomes contain chain of _____ particles.
a) Ferrite b) Nitrite
c) Magnetite d) Sulfite

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

a) Name the Activators and inhibitors of enzyme.
b) Define halophiles.
c) Define chemotaxis.
d) Define synchronous growth.
e) Oligodynamic effect.

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

a) Write a note on reserve food materials.
b) Facilitated diffusion.
c) Glyoxylate bypass.

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

a) Effect of substrate concentration on the action of Enzyme.
b) ED pathway.
c) Flagella of bacteria.

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

a) Describe classifications of enzymes.
b) Describe in detail structure and function of cell wall of gram-negative bacteria.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper – VI)
Pulse & Switching Circuits (22221319)

Day & Date: Friday, 22-12-2023 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 Select the correct alternatives for the following. **08**

1) Low pass RC circuit is used to generate a _____ from square wave.
   a) triangular wave b) pulse wave
   c) sawtooth wave d) rectangular wave

2) _____ sweep circuit is used in TV receiver for display.
   a) Voltage time base b) Current time base
   c) Boot strap sweep d) None

3) A bistable multivibrator _____.
   a) has two stable states
   b) has two unstable states
   c) is used to generate square wave
   d) has one quasi stable state

4) The reference voltage to thresh hold comparator In IC 555 is _____.
   a) 2/3 Vcc b) 1/3 Vcc
   c) 2/3 to 1/3 Vcc d) None

5) IC 74121 is _____ type of multivibrator.
   a) astable b) bistable
   c) monostable d) none

6) Clamper circuit is used to _____.
   a) to introduce dc level to ac signal
   b) suppress variation in amplitude of input signal
   c) obtain an output which is same as that of input signal
   d) none

7) Intrinsic stand of ratio of UJT is _____.
   a) Rb2/Rb1+Rb2 b) Rb1+Rb2/Rb1
   c) Rb1/Rb1+ Rb2 d) All

8) When transistor is driven in to saturation, its collector voltage is _____.
   a) zero b) Vce (sat)
   c) VCC d) Vcc/2

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

a) What is need of wave shaping circuit?
b) Define ideal ramp and practical ramp.
c) Define off time of switching transistor.
d) Give the formulae of frequency for astable multivibrator using gates.
e) Draw the functional block diagram of IC 555.

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

a) Concept of RC time base circuit.
b) Symmetrical triggering method of bistable multivibrator.
c) Voltage controlled oscillator using Ic 555.

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

a) Explain monostable multivibrator using IC 74121.
b) Explain positive clamping circuit by using diode.
c) Explain Hysteresis curve. If UTP = 0.9V and LTP= 0,4V Calculate Hysteresis voltage.

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

a) Explain Collector coupled astable multivibrator using BJT along with necessary wave forms and derive formulae for its frequency.
b) Explain construction and working of UJT as relaxation oscillator and derive its formulae for frequency.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper – VI)
Geography of India (22221325)

Day & Date: Friday, 22-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Select the most correct alternative. (1 mark each) **08**

1) _____ is a folded mountain.
   a) Himalayas b) Satpura
   c) Aravali d) Nilgiri

2) Siwaliks are _____.
   a) Himadri b) Foothills of Himalayan ranges
   c) Range of Meghalaya d) Range of Plateau

3) _____ soil is most suitable for the cultivation of cotton in India.
   a) Red soil b) Alluvial soil
   c) Laterite soil d) Regur soil

4) _____ line demarcates India Pakistan border.
   a) Radcliff Line b) Durand Line
   c) McMahan line d) 38th Parallel

5) _____ Type of high-quality of iron ore.
   a) Hematite b) Magnetite,
   c) Limonite d) Siderite

6) _____ types of coal having highest carbon content.
   a) Anthracite b) Bituminous
   c) Lignite d) Peat

7) Total distance of India from north to south is _____ Km.
   a) 2930 b) 3228
   c) 3214 d) 2933

8) India lies in the _____ hemisphere.
   a) Northern and eastern b) Southern and eastern
   c) Western d) Eastern

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

a) Define the term of Khadar.
b) Define the term of resources.
c) What is regionalization.
d) What is Alluvium.
e) Define the term of tribe.

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

a) Population growth of India.
b) Distribution of Rice in India.
c) Describe the different types of Soil of India.

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

a) Describe the Northern plain area of India.
b) Describe the different types of coal.
c) Describe the distribution of Iron ore of India.

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

a) Describe the factors affecting on population distribution.
b) Describe the different types of forest in India.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper – VI)
Igneous Petrology (22221311)

Day & Date: Tuesday, 16-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Which of the following is not intrusive igneous rock?
a) Basalt b) Gabbro
c) Dolerite d) Syenite

2) A Granitic texture indicates ____.
a) very rapid cooling
b) slow cooling
c) slow followed by rapid cooling
d) none of the above

3) Heavy crystals formed during the early phase of crystallization of a magma have a tendency to sink down is called _____.
a) fractional crystallization b) gaseous transfer
c) liquid immiscibility d) gravity settling

4) In discontinuous Bowen's reaction series _____ is the first mineral to crystalize.
a) plagioclase b) biotite
c) olivine d) muscovite

5) The contours in the ternary diagram represent melting temperatures are known as _____.
a) eutectic b) isotherm
c) liquidus d) none of these

6) In crystallization of binary magma, the freezing point of magma _____.
a) lowers b) Increase
c) same d) increase or decrease

7) The essential mineral in Gabbro rock are _____.
a) Quartz, Augite b) Quartz, Orthoclase
c) Augite, Plagioclase d) Quartz, Plagioclase

8) _____ rocks occur on the earth surface.
a) plutonic b) hypabyssal
c) Intermediate d) extrusive

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

a) Name the essential minerals in Dolerite.
b) Define pyrogenetic minerals.
c) What is metastable region?
d) Define Eutectic point.
e) Define rock.

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

a) Vesicular and amygdaloidal structure.
b) Porphyritic and Poikilitic texture.
c) Classification of Igneous rocks based on Colour index and mode of occurrence.

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

a) Explain Bowens discontinuous reaction series.
b) Explain composition of magma.
c) Explain discordant igneous intrusions in unfolded region.

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

a) Explain differentiation of magma by liquid immiscibility and filtration.
b) Explain crystallization of Unicomponent and Bicomponent magma.

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Seat No.	

Set P

B.Sc. (Semester - III) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper–VI)
Fundamentals of Bacterial Genetics (22221315)

Day & Date: Tuesday, 16-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The Thymine-Thymine dimer is formed when microorganism exposed to _____.
a) Acridine dyes b) Hydroxyl amine
c) Nitrous acid d) UV light

2) The method of DNA replication proposed by Watson and crick is _____.
a) Conservative b) Semi conservative
c) Dispersive d) Fragmentation

3) The mutation that occurs under natural conditions are called as ____ mutation.
a) Induced b) Base pair substitution
c) Spontaneous d) Deamination

4) The observable properties of organisms are called as _____.
a) Phenotype b) Genotype
c) Genome d) Gene

5) The distance between each turn in the helical strand of B form of DNA is _____ Å.
a) 3.4 b) 34
c) 10 d) 20

6) _____ enzyme seals the gap and joins the resynthesized segment of DNA during repair.
a) DNA ligase b) DNA Primase
c) AP endonuclease d) DNA topoisomerase

7) If 30% of the bases within a DNA molecule are adenine _____ is the percentage of thymine.
a) 20 b) 25
c) 30 d) 35

8) When one codon codes for two amino acid it is called as _____.
a) Anambiguous b) Ambiguous
c) Ombiguous d) universal

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

1) Define Missense mutation.
2) Define exon and intron.
3) Define cistron and recon.
4) What is Okazaki fragment?
5) Enlist the applications of plasmid.
6) Enlist the forms of DNA.

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

1) Discuss in brief mutation caused by Ultra violet light.
2) Discuss in detail types of plasmid.
3) Describe in detail Griffith experiment of transformation.

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

1) Describe in detail mutation caused by base analogues and nitrous acid.
2) Describe in detail Watson crick model of DNA.
3) Discuss in brief mechanism of transcription in prokaryotes.

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

1) Give a detailed account on mechanism of DNA replication in prokaryotes.
2) Describe in detail excision repair mechanism.

SLR-DA-106

Seat No.		Set	P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper - V)
Organic Chemistry (19201305)

Day & Date: Wednesday, 13-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat 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) Example of chromophoric group is _____.
a) -Cl b) -OH
c) >C=O d) $-NH_2$

2) In Cannizzaro's reaction, from benzaldehyde product formed is _____.
a) benzyl cyanide b) benzyl chloride
c) benzyl amine d) benzyl alcohol

3) The reduction of _____ gives phenyl hydrazine.
a) aniline b) benzene
c) benzene diazonium chloride d) nitrobenzene

4) Phenol is also called as _____.
a) carbolic acid b) benzyl alcohol
c) salicylic acid d) benzoic acid

5) _____ method is used for gravimetric estimation of methoxy group.
a) Duma's b) Ziesel's
c) Kjeldahl's d) Carius

6) N- substituted amide product is formed in _____.
a) Aldol condensation b) Perkin reaction
c) Beckmann transformation d) Ziesel's method

7) The catalyst used in Knoevenagel reaction is _____.
a) diethyl succinate b) diethyl malonate
c) ethyl alcohol d) benzyl chloride

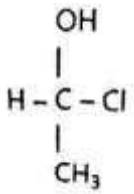
8) Malic acid on reduction with HI gives _____.
a) oxalic acid b) benzoic acid
c) acetic acid d) succinic acid

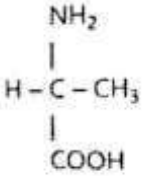
Q.2 Answer any four of the following. **08**

a) Starting from benzene diazonium chloride how will you prepare chlorobenzene and phenyl hydrazine?

b) What is the action of CH_3NH_2 and HBr on ethylene oxide?

c) Assign R or S configuration in the following compounds.

i) 

ii) 

d) Define diazotisation and write one example of diazonium salt.

e) What is the effect of Na at high temperature and $KHSO_4$ on glycerol?

f) Define Hypsochromic shift and Hypochromic shift.

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

a) Explain the conformational analysis of n-butane with energy profile diagram.

b) Explain Beckmann transformation for ketoximes.

c) Explain Aldol condensation with mechanism.

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

a) In Zeisel's method 1.147×10^{-4}kg of an organic compound gave 2.21×10^{-4}kg of silver iodide. Calculate percentage and number of OCH_3 groups present in the organic compound. (molecular weight of compound is 122).

b) Explain Hell-Volhard-Zelinsky reaction for preparation of halo acids.

c) Write bromination and oxidation reactions of cinnamic acid. Write uses of cinnamic acid.

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

a) What are glycols? How ethylene glycol is prepared? What is the effect of:

i) HCl
ii) Sodium
iii) periodic acid
iv) lead acetate
v) hydrolysis on ethylene glycol

b) Explain types of electronic transitions. Write applications of UV spectroscopy.

SLR-DA-107

Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper - V)
Data Structure (19201307)

Day & Date: Saturday, 23-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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) Djikstra's Algorithm
c) Prims 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) While evaluating a prefix expression, the string is read from?
a) left to right b) right to left
c) center to right d) center to left to right

5) Linked list is considered as an example of _____ type of memory allocation.
a) Dynamic b) Static
c) Compile time d) Heap

6) In _____ type of search the list is divided in to two parts.
a) Linear search b) Binary search
c) Random search d) None

7) What is the other name for a shell sort algorithm?
a) Diminishing increment sort b) Diminishing decrement sort
c) Insertion sort d) Selection sort

8) The Data structure used in standard implementation of Depth First Search is?
a) Stack b) Queue
c) Linked List d) Tree

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

a) List out the advantages of using Stack.
b) Define abstract data type.
c) State the difference between stack and queue.
d) Define Dequeue.
e) Define Binary Search tree.
f) What do you mean by breadth first search.

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

a) Explain adjacency matrix with example.
b) Explain tree traversal technique in detail.
c) Explain Stack with all operations.

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 Binary search.
b) Convert the following Infix Expression to Postfix by using an algorithm.
A + (B * C - D) + E / F * (G -H)

SLR-DA-108

Seat No.		Set	P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper–VI)
Inorganic Chemistry (19201306)

Day & Date: Thursday, 14-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled 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 Select the most correct alternative from among those given below and rewrite the sentence: **08**

1) Effective atomic number (EAN) of iron in $[Fe(CN)_6]^{4-}$ complex ion is _____.
a) 34 b) 35
c) 37 d) 36

2) EDTA has _____ acidic group.
a) four b) two
c) three d) one

3) CO is _____.
a) Hard acid b) Soft base
c) Hard base d) Soft acid

4) _____ is the oxidation state of Mn in $KMnO_4$.
a) +5 b) +6
c) +7 d) +4

5) _____ is the element of first transition series which show anomalous electronics configuration.
a) Chromium b) Scandium
c) Iron d) Manganese

6) Chelating agent must possess at least _____ donor group.
a) one b) three
c) two d) four

7) Lewis acid is _____ accepter.
a) electron b) neutron
c) neutron pair d) electron pair

8) The IUPAC nomenclature of $K_3[Fe(CN)_6]$ is _____.
a) Potassium hexacyanoferrous (III)
b) Potassium hexacyanoferrate(III)
c) Potassium hexacyanoferrate(II)
d) Potassium hexa cyano ferrate (III) ion

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

a) Define:
- i) Double salt
- ii) Coordination sphere

b) Compare 1st transition series with 2nd and 3rd transition series w.r.to reactivity and oxidation state

c) What is optical isomerism? Give its any one example.

d) Write only structure of Mg-EDTA chelate complex ion.

e) State Pearson's principle.

f) Write the observed electronic configuration of Molybdenum and Palladium

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

a) Geometrical isomerism of coordination compounds having CN =4

b) Difference between metal chelate and metal complex.

c) Magnetic behavior of 3d-transition elements.

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

a) Write the postulates of Werner's theory and explain the structure of $CoCl_3 \cdot 5NH_3$

b) Give the applications of HSAB principle.

c) Explain the general characteristics of 3d block elements w.r.to colour.

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

a) What are transition elements? Give the symbol, name, atomic number and electronic configuration of elements of third transition series.

b) On the basis of VBT, explain the formation of $[Cu(CN)_4]^{4-}$ complex ion. Comment on its stability and magnetic property.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper - VI)
Design Analysis and Algorithm (19201308)

Day & Date: Sunday, 24-12-2023 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 Multiple choice questions. **08**

1) Dijkstra's algorithm is used to solve _____ problems?
a) Network lock b) Single source shortest path
c) AII pair shortest path d) Sorting

2) Which of the following is used for solving the N Queens Problem?
a) Greedy algorithm b) Dynamic programming
c) Backtracking d) Sorting

3) To main measures of the efficiency of an algorithm are _____.
a) Time and space complexity b) Data and space
c) Processor and memory d) complexity and capacity

4) Which of the following data structure is used to perform recursion?
a) Linked List b) Array
c) Queue d) Stack

5) What is the time complexity of the binary search algorithm?
a) O(n) b) O(1)
c) O(log2 n) d) 0(n^2)

6) Which of the following algorithms are used for string and pattern matching problems?
a) Prim's algorithm b) Rabin karp algorithm
c) Bellman Ford Algorithm d) all of the above

7) Longest Common Subsequence Problem can be solved by _____.
a) Greedy Method b) Divide & Conquer
c) Dynamic Programming d) None of these

8) The time complexity to find the longest common subsequence of two strings of length M and N is?
a) O(n) b) O(M*N)
c) O(M) d) O(log N)

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

a) What is Asymptotic Notation?
b) Differentiate Time Efficiency and Space Efficiency?
c) What is a Linear Search?
d) What is Dynamic Programming?
e) What are the disadvantages of an algorithm?
f) List the advantage of the greedy algorithm.

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

a) Recursive and Non-recursive algorithms.
b) Minimum Spanning Tree.
c) Merge Sort and Quick sort.

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

a) Explain Dynamic Programming algorithm with its different Approaches.
b) Explain backtracking algorithm?
c) Explain Travelling Salesman Problem?

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

a) What is Branch and bound? Explain methods of Branch and bound with suitable example.
b) Consider the problem having weights and profits are:

objects: 1, 2, 3, 4, 5, 6, 7
Profits (P): 10, 15, 7, 8, 9, 4
Weight(w): 1, 3, 5, 4, 1, 3, 2
W (Weight of the knapsack): 15
n (no of items): 7
The above problem can be solved by using the Fractional Knapsack Problem method:

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - V)
General Physics and Sound (19201323)

Day & Date: Friday, 15-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Select correct alternatives: **08**

1) Vector triple product of three vectors $\vec{a}, \vec{b}, \vec{c}$ is defined as _____.
a) $\vec{a} \times (\vec{b} \times \vec{c})$ b) $\vec{a}.(\vec{b} \times \vec{c})$
c) $\vec{a} \times (\vec{b}.\vec{c})$ d) $\vec{a}.(\vec{b}.\vec{c})$

2) The relation between precessional torque (τ_1) and rate of precession (ϕ) is _____.
a) $\phi = \frac{\tau_1}{\omega}$ b) $\phi = \frac{I\omega}{\tau_1}$
c) $\phi = I\omega\tau_1$ d) $\phi = \frac{\tau_1}{I\omega}$

3) Gyrocompass is used to show _____.
a) magnetic north-south direction.
b) geographic north-south direction
c) angle of dip
d) weather conditions in sea

4) Bending moment of the beam is _____.
a) directly proportional to the radius of curvature
b) inversely proportional to the radius of curvature
c) directly proportional to the modulus of rigidity
d) inversely proportional to Youngs modulus

5) The beam horizontally fixed at one end and loaded at free end is called _____.
a) cantilever b) column
c) free beam d) oscillating beam

6) The CGS unit of viscosity is _____.
a) Kg/m.s b) poise
c) gm.cm/s d) N.s/m^2

7) Decay of sound energy in a hall is _____.
a) constant b) linear
c) exponential d) sinusoidal

8) The human audible range is _____.
a) 20 Hz to 20 kHz b) 2 Hz to 2 kHz
c) 20 kHz and above d) 20 MHz and above

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

a) What is del operator?
b) State any two applications of gyroscopic motion.
c) Define elasticity.
d) Define terminal velocity.
e) Write down the equation for Stokes law.
f) Which factors affect the acoustics of buildings?

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

a) Show that
$(\vec{A} \times \vec{B}) \times \vec{C} + (\vec{B} \times \vec{C}) \times \vec{A} + (\vec{C} \times \vec{A}) \times \vec{B} = 0$
b) Write a short note on Rotating cylinder viscometer.
c) Write a note on pressure microphone.

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

a) Show that the vectors
$\vec{A} = 3\hat{\imath} - 4\hat{\jmath} + 5\hat{k}$, $\vec{B} = \hat{\imath} + 2\hat{\jmath} - 3\hat{k}$ and $\vec{C} = 4\hat{\imath} - 2\hat{\jmath} + 2\hat{k}$ are coplanar.
b) Write a note on Ostwald's viscometer.
c) Write a note on moving coil loud speaker.

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

a) Discuss the case of thin circular disc rolling over a plane horizontal surface and obtain expression for angle of lean.
b) Derive an expression for the depression produced at the midpoint of a beam supported at both ends and loaded at the centre.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
BIO-CHEMISTRY (Paper – I)
Biomolecules (19201303)

Day & Date: Tuesday, 26-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) _____ is not a factor responsible for the denaturation of proteins.
a) pH change b) organic change
c) Heat d) Charge

2) ATP is a _____.
a) nucleoside b) nucleotide
c) vitamin d) nucleic acids

3) Terpenes are lipids derived from _____.
a) isoprene b) phospholipids
c) waxes d) sterols

4) The bond between amino acids is called as _____.
a) ionic bond b) hydrogen bond
c) peptide bond d) acidic bond

5) Deficiency of niacin is caused due to the deficiency of _____.
a) Scurvy b) Rickets
c) Pellagra d) Pernicious anemia

6) Building blocks of nucleic acids are _____.
a) amino acids b) nucleosides
c) nucleotides d) histones

7) Which of the following disease is caused by deficiency of niacin?
a) Scurvy b) Rickets
c) Pellegra d) Pernicious anemia

8) The example of derived lipid is _____.
a) Terpenes b) Steroids
c) Carotenoids d) All of the above

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

a) Define spingo-lipid and phospholipid.
b) Write the deficiency disorders of thiamine.
c) What are functions of cholesterol?
d) Write the any two structures of pentose carbohydrate.
e) What are vitamins? Write examples.
f) What are the components of nucleic acids?

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

a) Write note on non protein amino acids and their functions.
b) Write the structure and role of Starch.
c) Write note on structure and function of m-RNA.

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

a) Write structure and function of terpenes and carotenes.
b) Write distinction between DNA & RNA.
c) Write differences between water soluble and fat soluble vitamins.

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

1) Define pentose and hexose. Write structure and role of xylose, xylulose and fructose.
2) Define protein. How peptide bond is formed? Explain secondary structure of protein.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
PLANT PROTECTION (Paper – I)
Major crops and methods of integrated plant protection (19201325)

Day & Date: Tuesday, 26-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of a 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) Vernacular name of Sorghum vulgare is _____.
a) Rice b) Bajara
c) Jawar d) Wheat

2) Soyabean crop is taken in _____ season.
a) Summer b) Rabbi
c) Kharip d) None of these

3) Tur belongs to family _____.
a) Caesalpinaceae b) Combretaceae
c) Leguminosae d) Solanaceae

4) Ethanol is a byproduct obtained from _____.
a) Tur b) G. nut
c) Sugarcane d) Soyabean

5) Grape berries are used for preparing _____.
a) Kishmish b) Asawa
c) Churna d) Kadha

6) Brinjal belongs to family _____.
a) Rosaceae b) Leguminocae
c) Solanaceae d) None of these

7) Botanical name of rose is _____.
a) *Rosa indica* b) *Mimosa phdica*
c) *Gossypium Sp* d) *Gladiolus Sp*

8) Sticky bands are used to prevent _____.
a) Reptile movement
b) Aves movement
c) Movement of craving insects towards host
d) None of these

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

a) Give the significance of plant protection.
b) Give the role of organic farming in agriculture.
c) What is crop rotation?
d) What is crop dragging?
e) What is field sanitation?
f) Write on 'bagging'?

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

a) Biofertilizers
b) Plant quarantine
c) Biological control of plant diseases.

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

a) Describe physical methods of plant protection.
b) Write in brief account & use of nematicides.
c) Explain use of resistant varieties.

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

a) Give the crop identification, soil type, tillage, seed rate and spacing, intercultural operation, fertilizers, irrigation, intercropping, yield & economic importance of Tur.
b) Give the crop identification, soil type, tillage, seed rate and spacing, intercultural operation, fertilizers, irrigation, intercropping, yield & economic importance of grapevine.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - VI)
Electronics (19201324)

Day & Date: Saturday, 16-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat 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) Negative voltage feedback circuit introduces phase shift of _____.
a) $\text{Zero}°$ b) $90°$
c) $180°$ d) $360°$

2) Audio frequency oscillator generates waves of frequency range _____.
a) 20 Hz to 20 kHz b) 20 kHz to 200 kHz
c) 20 kHz to 30 MHz d) 1 MHz to 100 MHz

3) UJT is a _____ resistance device.
a) positive b) negative
c) very high d) zero

4) The inner wall of CRT is coated with _____ Material.
a) carbon particles b) phosphor
c) Zinc oxide d) Iron

5) The relation between FET parameters g_m, r_d, and μ is _____.
a) $\mu = g_m \times r_d$ b) $g_m = \mu \times r_d$
c) $r_d = g_m \times \mu$ d) $\mu = 1/g_m \times r_d$

6) Electronic circuit which converts d.c. energy into a.c. energy is called _____.
a) Amplifier b) Rectifier
c) UJT d) Oscillator

7) The time period of waveform measured on CRO is 40 ms then unknown frequency of wave is _____.
a) 0.25 Hz b) 25 Hz
c) 50 Hz d) 0.5 KHz

8) IC 78XX series provides _____ fixed out put voltage.
a) Dual b) regulated negative
c) negative d) positive

Q.2 Answers the following. (Any Four) **08**

a) Define
1) % line regulation
2) % load regulation

b) Define the term feedback and give its type.

c) Calculate voltage gain of an amplifier for output voltage 8 volt and given input voltage 80 mV.

d) What is mean by oscillator? Which type of feedback is used in oscillator?

e) What are two applications of CRO?

f) Show graphically pinch-off region, ohmic region and breakdown region of FET characteristics.

Q.3 Answers the following. (Any Two) **08**

a) Explain the voltage divider biasing with neat circuit diagram and obtain the relation of collector current.

b) How the FET is used as voltage variable resistor?

c) Describe construction, working of UJT with suitable circuit diagram.

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

a) Explain single ended input and double ended output mode of differential amplifier.

b) Explain variable power supply using IC LM317 with neat circuit diagram.

c) Draw the neat circuit diagram of dual power supply and describe it in detail.

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

a) State the principal of CRT and describe construction and working with neat block diagram.

b) Draw the circuit diagram of phase shift oscillator and explain its construction and working.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
BIO CHEMESTRY (Paper - II)
Biochemical Techniques (19201304)

Day & Date: Wednesday, 27-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Monoclonal antibodies are produced by _____.
   a) Hybridomas b) Lymphocytes
   c) myeloma cells d) plasma cells

2) Electrophoresis is not used for the separation of _____.
   a) nucleic acids b) Proteins
   c) amino acids d) Lipids

3) Broadford essay is applied for _____.
   a) isolation of DNA
   b) protein purification
   c) separation of proteins
   d) determination of protein concentration

4) Which radiation source has electrode in construction of spectrophotometer?
   a) Tungsten lamp b) Hydrogen discharge lamp
   c) Xenon Discharge Lamp d) Mercury lamp

5) Amino benzyloxymethyl filter paper is commonly used for transfer in _____.
   a) Southern blotting b) Northern blotting
   c) Western blotting d) Eastern blotting

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) Iodine number of cholesterol is _____.
   a) 1 b) 2
   c) 3 d) 4

8) The _____ are generally used as sample holders in spectrophotometer.
   a) aluminum tubes b) wooden blocks
   c) glass cuvettes d) quartz cells

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

1) Define acid value and iodine number.
2) Write two applications of colorimeter.
3) What is definition and principle of chromatography?
4) What is DPA method?
5) Write two advantages of Gel Permeation Chromatography.
6) What is blotting technique?

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

1) Write the working of spectrophotometer.
2) Write principle and technique of GPC.
3) Explain native and denaturing polyacrylamide gel electrophoresis.

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

1) Explain hybridoma technology.
2) What is DNSA method for carbohydrates?
3) Write note on western blotting.

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

1) What is chromatography? Explain principle, technique and application of HPLC.
2) Write preparation of gel plate, application of sample and mechanism of separation in 2-D electrophoresis.

SLR-DA-115

Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
PLANT PROTECTION (Paper – II)
Crop Diseases and Their Management (19201326)

Day & Date: Wednesday, 27-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Draw a well diagram wherever necessary.
3) All question carry equal marks.

Q.1 Multiple Choice Question. **08**

1) The ability of pathogen to cause the disease is known as _____.
a) Pathogenesis b) Pathogenicity
c) Immunity d) Susceptibility

2) _____ Diseases spreads throughout entire plant body.
a) Localised b) Systemic
c) Epidemic d) Sporadic

3) A sooty or charcoal- like powdery mass is _____.
a) Rust b) Smut
c) Scab d) Blotch

4) _____ disease is classified on the basis of symptoms.
a) Infectious b) Non- infectious
c) Chlorosis d) None of these

5) Causal organism of Grain smut of jowar is _____.
a) *Sphacelotheca sorghi* b) *Xanthomonus citr*
c) *MLOS* d) *Hibiscus*

6) *Phakospora pachyrrhiza* is causal organism of _____ host plant.
a) Groundnut b) Soybean
c) Okra d) Cucurbit

7) Keeping inoculated micro-organisms on suitable medium at particular temperature and time is process called as _____.
a) Isolation b) Infection
c) A & B d) Incubation

8) The entry of plants, plant parts and their products is conditioned, regulated and restricted at national and international levels through _____.
a) National Act b) International Act
c) Quarantine Act d) None of these

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

a) Isolation.
b) Resistant.
c) Pathogenesis.
d) Write the name of Act of plant
e) Mention any two fungal disease of plant.
f) Mention causal organism of Rust of Ground nut.

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

a) Methods of inoculation
b) Control measures of Downy mildew of Graps.
c) Kotch's Postulates

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

a) Give an account on classification of plant diseases.
b) Write on Assessment of diseases in crop plant.
c) Describe the Little leaf of Brinjal.

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

a) Write the Principles of plant disease management.
b) Describe in details about Grain smut of jawar.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - V)
Probability Distributions – I (19201329)

Day & Date: Sunday, 17-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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 has a Poisson distribution with parameter λ i.e. $X \sim P(\lambda)$, then the second moment about origin μ'_2 is _____.
a) λ b) λ^2
c) 2λ d) $\lambda^2 + \lambda$

2) If $X \sim Geo(0.5)$ then, the mean of waiting time distribution is _____.
a) 2 b) 1
c) 0.5 d) None of these

3) If X follows negative binomial distribution with parameter k and p then _____.
a) mean > variance b) mean = variance
c) mean = 2 variance d) mean < variance

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) Which of the following sample space is not a continuous sample space?
a) $\{X | X \geq 0\}$ b) $\{X | -\infty < X < \infty\}$
c) $\{X | -5 < X < 5\}$ d) $\{X | X$ is positive integer$\}$

6) If X is continuous r. v. then $P[X < Q_1] =$ _____.
a) $\frac{1}{4}$ b) $\frac{1}{2}$
c) $\frac{3}{4}$ 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 these

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

a) Define Poisson distribution.
b) Define multinomial distribution.
c) Define probability density function
d) Define Marginal density function of Y.
e) Define covariance of (X, Y)

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

a) Find mean and variance of geometric distribution.
b) If $E(X) = 1$ and $Var(X) = 5$, find
1) $E[(2 + X)^2]$
2) $Var(4 + 3X)$
c) Suppose the random variables X and Y have the joint density function defined by

$$f(x,y) = \begin{cases} k(2x+y) & ; \ 2 < x < 6, 0 < y < 5 \\ 0 & ; \quad \text{otherwise} \end{cases}$$

Find
1) k
2) $P(X > 3, Y > 2)$

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

a) Find the recurrence relation for probability for negative binomial distribution.
b) The p.d.f. of a continuous r.v. X is

$$f(x) = \frac{1}{4}(x-1)^3 \quad ; 1 \le x \le 3$$
$$= 0 \quad ; \text{ otherwise}$$

Obtain the distribution function of X.
c) Let (X, Y) have the joint density function.

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

Verify whether X and Y are independent.

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

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

$$f(x) = \begin{cases} Kxe^{-\lambda x} & \text{if } x \ge 0, \lambda > 0 \\ 0 & \text{otherwise} \end{cases}$$

Determine K, Mean and variance
b) Show that sample mean square is unbiased estimator of population mean square.

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

Find
a) Marginal density function of X
b) Marginal density function of Y
c) Conditional density function of X given $Y = y$
d) Conditional expectation X given $Y = y$

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
METEOROLOGY (Paper – I)
Climatology (19201321)

Day & Date: Thursday, 28-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Normal lapse rate in the atmosphere is _____ ^{0} C per 1000 m.
a) 5.6 b) 7.5
c) 6.5 d) 4.6

2) Isotherm are the lines joining places of equal _____.
a) Salinity b) Pressure
c) Rainfall d) Temperature

3) Climatology is compounded by _____ word.
a) Arab b) Greek
c) Roman d) French

4) An _____ is an immense body of air.
a) Front b) Air mass
c) Frontolysis d) Humidity

5) _____ is the science which studies the atmosphere.
a) Hydrology b) Climatology
c) Pedology d) Phytology

6) There are _____ major source region of air masses.
a) 6 b) 4
c) 10 d) 8

7) Carbon dioxide occupies _____ % gaseous in the atmosphere
a) 0.09 b) 0.004
c) 21 d) 0.03

8) Monsoon is the wind system of the _____ region.
a) Tropical b) Polar
c) Sub-polar d) Sub-tropical

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

a) Explain scope and content of climatology.
b) Describe the planetary wind systems.
c) Continental air mass.

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

a) Explain general circulation in northern hemisphere.
b) Explain climatology and its branches.
c) Composition of atmosphere.

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

a) Give an account of Structure of atmosphere.
b) Explain in brief the modification of air masses.

SLR-DA-118

Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
GEO-CHEMISTRY (Paper - I)
Introduction to Geochemistry (19201313)

Day & Date: Thursday, 28-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Stable phase diagram occurs when there is _____ condition.
a) Solid + liquid b) Solid + vapour
c) Liquid + vapour d) Liquid + liquid

2) The dotted line in the phase diagram represents _____.
a) Stable equilibrium b) True equilibrium
c) Metastable equilibrium d) False equilibrium

3) Which of the following is not a crystal system?
a) Cubic b) Trigonal
c) Triclinic d) Hexaclinic

4) In kaolinite crystal, the layers are held by _____ bond.
a) Ionic bond b) Cationic linkage
c) Hydrogen bond d) Electrostatic bond

5) Phase rule was first discovered by _____.
a) Nerst b) Le Chatclier
c) Arrenius d) Gibb's

6) _____ is the example of electropositive colloid.
a) Gold b) Lead
c) Silver d) Platinum

7) For water system, the number of phases at the triple point is _____.
a) 0 b) 1
c) 2 d) None of these

8) The value of lattice energy is affected by _____.
a) Size and charge of ions b) Size of ions only
c) Charge of ions only d) Mass of ions

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

a) What is meant by crystal lattice?
b) What is homologous series of organic compounds?
c) Write two optical properties of colloids.
d) Write two applications of phase rule.
e) What is principle of crystal structure?
f) What are kinds of colloidal system?

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

a) Explain kinds of colloidal system.
b) Explain formation of crystal and lattice energy of crystals.
c) Write mechanical and optical properties of colloids.

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

a) Explain molecular formula of organic compound.
b) Explain Goldschmidt's Mineralogical phase rule.
c) Explain one component (water and sulphur) system.

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

a) What is radius ratio? Explain structure of Sodium Chloride, Cesium Chloride.
b) Write general characteristics of organic compounds and write classification of organic compounds.

SLR-DA-119

Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper - V)
Cell Biology (19201331)

Day & Date: Thursday, 28-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Which give mechanical support to the cell and help to maintain it's shape?
   a) Cytoplasm b) Mitochondria
   c) Cytoskeleton d) Ribosomes

2) In eukaryotic cells the chromosomes are located in _____.
   a) Nucleus b) Nucleolus
   c) Golgi complex d) Lysosomes

3) Which of the following is not a component of the nucleus?
   a) Chromosome b) Nucleolus
   c) Cytoplasm d) Nuclear envelope

4) Chromatin consist of _____.
   a) DNA b) RNA
   c) DNA + histones d) RNA + histones

5) Fluid mosaic model of plasma membrane was proposed by _____.
   a) Robertson b) Singer and Nicolson
   c) Landsteiner d) Davason- Danielli

6) In meiosis pairing of homologus chromosomes takes place during _____.
   a) Leptotene b) Zygotene
   c) Diplotene d) Pachytene

7) _____ are the power houses of the cell.
   a) Mitochondria b) Nucleus
   c) Nucleolus d) Ribosome

8) In cells _____ plays important role in protein synthesis.
   a) Endoplasmic reticulum b) Golgi complex
   c) Mitochondria d) Lysosomes

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

a) S- Phase
b) Cell signaling
c) Virus
d) Functions of lysosomes
e) Chromatin
f) Functions of nucleus

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

a) Nucleolus
b) Eukaryotic cell
c) Structure of Golgi apparatus

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

a) Describe the structure and functions of microfilaments.
b) Role of secondary messengers (cAMP).
c) Describe the fluid mosaic model of plasma membrane.

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

a) Describe the structure and functions of mitochondria.
b) Describe in detail various stages in mitosis.

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Seat sNo.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - VI)
Statistical Methods (19201330)

Day & Date: Monday, 18-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) With usual notations, the regression equation X_2 on X_1 and X_3 is _____.

a) $X_2 = b_{12.3}X_1 + b_{32.1}X_3$ b) $X_2 = b_{21.3}X_1 + b_{23.1}X_3$

c) $X_2 = b_{12.3}X_3 + b_{32.1}X_1$ d) $X_2 = b^2_{12.3}X_1 + b^2_{23.1}X_3$

2) The order of partial regression coefficient $b_{12.345\ldots\ldots n}$ is _____.

a) n b) $n+2$
c) $n-1$ d) $n-2$

3) R chart is used to control the variation _____.

a) within the subgroups b) between the subgroups
c) both within and between d) between the operator

4) The control lines are _____.

a) always equidistant from central line
b) equidistant from central line for $\bar{X}$ chart
c) equidistant from central line for R chart
d) All of these

5) Which one of the following is correct difference between a parameter and a statistic?

a) we estimate a statistic but not a parameter
b) parameter can have a sampling distribution while statistic can not
c) parameter is an unknown constant while statistic is a random variable
d) parameter can have a standard error while statistic can not

6) The relation between expected value of range R and standard deviation σ with usual constant factors is _____.

a) $E(R) = d1\ \sigma$ b) $E(R) = d2\ \sigma$

c) $E(R) = D1\ \sigma$ d) $E(R) = D2\ \sigma$

7) The standard error is a standard deviation of _____.

a) a random variable b) a statistic
c) a parameter d) None of these

8) If μ and σ are process mean and standard deviation respectively, then 3σ control limits are given by _____.

a) $\mu \pm \sigma$ b) $\mu \pm 3\sigma$
c) $\mu \pm 2\sigma$ d) None of these

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

a) State 3σ control limits for C chart.

b) Define partial correlation coefficient $r_{ij.k}$

c) Define multiple correlation coefficient $R_{ij.k}$

d) Define a statistic.

e) Define SRSWOR.

f) Define standard error.

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

a) With usual notation, prove that $b_{ij.k} * b_{ji.k} = r_{ij.k}^2$

b) If $r_{12} = r_{13} = r_{23} = \varrho \neq 1$, than find $r_{23.1}$

c) Prove that, in SRSWOR, expected value of product of population size and sample mean is population total.

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

a) With usual notation, prove that in SRSWOR.

$$E(\bar{y}_n) = \bar{Y}_N$$

b) Explain the construction of R chart when standards are given.

c) Obtain an expression for mean and variance of the residual $X_{12.3}$

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

a) Prove that the necessary and sufficient condition for the three regression planes to coincide is

$$r_{12}^2 + r_{13}^2 + r_{23}^2 - 2r_{12}r_{13}r_{23} = 1$$

b) Distinguish between chance causes and assignable causes of variations.

SLR-DA-121

Seat No.		Set	P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
METEOROLOGY (Paper–II)
General Meteorology (19201322)

Day & Date: Friday, 29-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The atmospheric air is held to the Earth by: _____.
   a) Gravity b) Winds
   c) Clouds d) Rotation of the Earth

2) Which of the following has the highest entropy?
   a) Hydrogen b) Diamond
   c) Liquid nitrogen d) Mercury

3) The first law of thermodynamics is called as principle of conservation of _____.
   a) energy b) mass
   c) charge d) momentum

4) The frame of reference associated with a rotating body is _____.
   a) unaccelerated b) accelerated
   c) steady d) nonrotating

5) The latitude of the equator is _____.
   a) 0° b) 23.5°
   c) 45° d) 90°

6) The source of electrical energy used for satellites is _____.
   a) Solar cells b) Edison cells
   c) Fuel cells d) Cryogenic cells

7) How many types of solar cells are there based on the crystal structure?
   a) two types b) three types
   c) four types d) five types

8) In energy technology, useful energy is called as _____.
   a) synergy b) exergy
   c) anergy d) work

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

a) Two gram of ice melts. Calculate the amount of heat energy (in calories) it absorbs.
b) What are properties of radiations?
c) What are effects of ozone in troposphere?
d) Why winds flow?
e) Mention uses of artificial satellites.
f) Write down energy chain for hydrothermal power plant.

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

a) Discuss effects of Coriolis force in nature.
b) Discuss interrelation between energy, man, and environment.
c) Discuss energy demand.

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

a) Explain in short 'Tephigram'.
b) Explain depletion of ozone layer.
c) Explain Coriolis force.

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

a) Discuss effects of scattering.
b) What is geo-stationary satellite? Distinguish between geo-stationary satellite and polar orbiting satellite.

SLR-DA-122

Seat No.		Set	P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
GEO-CHEMISTRY (Paper – II)
Introduction to Solar System and Geo-Sphers (19201314)

Day & Date: Friday, 29-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat 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) Which of the following is the correct pair of meteorites?
a) Siderites - irons b) Aerolites-stony
c) Siderolite- stony irons d) All of the above

2) In seawater composition dissolve gases are _____.
a) $SO_4 > CI > HCO_3$ b) $HCO_3 > SO_4 > CI$
c) $CI > HCO_3 > SO_4$ d) $CI > SO_4 > HCO_3$

3) Elements which readily-form ions with an outermost 8-electron shell are:
a) Siderophile b) Chalcophile
c) Lithophile d) Atmosphere

4) In cosmic abundance of elements, elements of _____ atomic number are more abundant than those of _____ atomic number on either sides.
a) Even ___ odd, b) odd ___ even,
c) high ___ low, d) Low ___ high

5) Which of the following is outermost layer of the atmosphere?
a) Troposphere b) stratosphere
c) Thermosphere d) mesosphere

6) The upper layer of crust is made up of _____.
a) Silicon and Iron b) Silicon and Aluminium
c) Iron and magnesium d) Silicon and magnesium

7) Which planet is an exceptional case of Bode's law?
a) Mars b) Saturn
c) Uranus d) Neptune

8) Which of the following is NOT a major component of the atmosphere?
a) Nitrogen b) oxygen
c) ozone d) argon

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

a) Pallasites and the meso-siderites are types of which meteorites?
b) Who coined the concept of geochemical classification of the elements?
c) What is transitional zone?
d) Names the major elements of cosmic abundance of elements.
e) What is the average composition of terrestrial water?
f) What is the composition of troilite?

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

a) Variable constituent of Atmosphere.
b) Salinity and chlorinity of oceanic water
c) Composition of Planets

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

a) Describe the geochemical classification of elements.
b) Explain in brief an Evolution of the atmosphere and its addition and losses during geological time.
c) Discuss the brief an Aerolites.

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

a) Define meteorite. Explain the different types of Meteorites.
b) Describe interior structure of the earth and its whole composition.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper–VI)
Principles of Ecology (19201332)

Day & Date: Friday, 29-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The study of interactions between living organisms and environment is Called _____.
a) Ecology b) Ecosystem
c) Phytogeography d) Phytosociology

2) A population is a group of _____.
a) Species in a community b) Communities in ecosystem
c) Individuals in a species d) Individuals in a family

3) When both partners are affected negatively the nature of interaction is _____.
a) Commensalism b) Compition
c) Predation d) Amensalism

4) Which of the following is known as an edaphic abiotic factor _____.
a) Light b) Air
c) Water d) Soil

5) _____ is the first species to inhabit barren area.
a) Climax species b) Endangered species
c) Threatened species d) pioneer species

6) Which is the largest ecosystem on earth _____.
a) Ocean b) Desert
c) Forest d) Grassland

7) Why organisms in food chains are grouped into categories _____.
a) To form community b) To share the energy
c) To form tropic levels d) To get more energy

8) _____ is one of the most prevalent hotspots of biodiversity in India.
a) Himalayas b) Western Ghats
c) Ganges d) None of the above

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

a) Autecology
b) Population density
c) Mutualism
d) Abiotic factor- temperature
e) Parasitism
f) Lentic water

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

a) Survivorship curve
b) Parental care in fishes
c) species richness

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

a) Brief idea of biodiversity
b) Food chain
c) Ecological succession in pond ecosystem

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

a) Describe grassland ecosystem
b) Explain Hot spots Biodiversity in India

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper – V)
Differential Calculus (19201319)

Day & Date: Tuesday, 19-12-2023 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 and write correct answer from given four alternatives. **08**

1) The polar sub tangents equal to _____.
a) $\frac{d\theta}{dr}$ b) $r\frac{d\theta}{dr}$
c) $r^2\frac{d\theta}{dr}$ d) $\frac{1}{r}\frac{d\theta}{dr}$

2) Angle of inter section of curves $r = a(1+\sin\theta)$ and $r = a(1-\sin\theta)$ is _____.
a) 0 b) $\pi/2$
c) π d) $-\pi/2$

3) Radius of curvature of $y = x^2$ at $(\sqrt{2},\ 2)$ is _____.
a) $\frac{27}{2}$ b) $\frac{2}{27}$
c) 2 d) 3

4) The pedal formula for the radius of curvature is _____.
a) $p = r + \frac{dr}{dp}$ b) $p = r\frac{dp}{dr}$
c) $P = r\frac{dr}{dp}$ d) $P = r + \frac{dp}{dr}$

5) If u, v are function of x, y then jacobian of u, v with respect to x, y is a determinate of order _____.
a) 4 b) 2
c) 3 d) n

6) If $u = x^2, v = y^2$ then $\frac{\partial(u,v)}{\partial(x,y)} =$ _____.
a) xy b) $4xy$
c) $\frac{1}{xy}$ d) $\frac{1}{4xy}$

7) A function $f(x,y)$ has an extreme value at (a,b) then _____.
a) $AC - B^2 > 0$ b) $AC - B^2 < 0$
c) $AC - B^2 = 0$ d) None of these

8) A function $f(x) = x^3 - 6x^2 + 24x + 4$ has _____.

a) a maximum value at $x = 2$
b) a minimum value at $x = 2$
c) minimum at $x = 6$ and maximum at $x = 4$
d) Neither maximum nor minimum at any point

Q.2 Attempt any Four. **08**

a) Find equation of tangent and normal at (a, a) to the curve $x^2y^3 = a^5$

b) Show that the sub-normal at any point of a parabola is constant length and sub-tangent varies as the abscissa of the point of contact.

c) Find radius of curvature at point $s = 4a \sin \Psi$ at $\Psi = 0$

d) Find radius of curvature of the parabola $x = at^2, y = 2at$ at 't'.

e) Show that the function $u = x + y - z, v = x - y + z, w = x^2 + y^2 + z^2 - 2yz$ are dependent to each other.

f) Find the points on the Sunface $z^2 = xy + 1$ which are at the least distance from the origin.

Q.3 Attempt any Two. **08**

a) Find the polar subtangent and subnormal for $r = a(1 + \cos \theta)$

b) Find Radius of Curvature for parametric equation.

c) Show that for the curve $r = ae^{b\theta^2}$

$$\frac{polar\ sub\ normal}{polar\ \ sub\ tangent} \propto \theta^2$$

Q.4 Attempt any Two. **08**

a) If $x = r \cos \theta, y = r \sin \theta$ then find $\frac{\partial(xy)}{\partial(r\theta)}$ and $\frac{\partial(r\theta)}{\partial(xy)}$

b) In vestigate the maximum and minimum value of function $f(x) = 2x^3 - 15x^2 + 36x + 10$

c) Prove that for the ellipse $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$

$$\varrho = \frac{(a^4y^2 + b^4x^2)^{3/2}}{b^4a^4}$$

Q.5 Attempt any One. **08**

a) If u, v, w be function of three variable x, y, z. if J is jacobian of u, v, w with respect to x, y, z and J' is jacobian of x, y, z with respect to u, v, w then show that $JJ' = 1$

b) Explain Lagrange's method of undetermined multipliers to determine extreme values of $u = f(x, y, z)$ subject to condition $\emptyset(x, y, z) = 0$. Also find the extreme value of xy^2z^3 subject to condition $x + y + z = 6$

SLR-DA-125

Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper – V)
Plant Anatomy (19201301)

Day & Date: Saturday, 30-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The living mechanical tissue is _____.
a) Fibers b) Parenchyma
c) Sclerenchyma d) None of these

2) Drosera possesses _____.
a) Vesicles b) Oil gland
c) Nectories d) Digestive gland

3) Tunica-corpous theory was proposed by _____.
a) Schmidt b) Hanstein
c) Strasburger d) Nageli

4) Epidermal outgrowth is called as _____.
a) Spines b) Trichomes
c) Stomata d) Prinkles

5) Procambium gives rise to _____.
a) Epidermis b) Vascular bundle
c) both a & b d) Cortex

6) _____ among the following is simple tissue.
a) *Trachides* b) *Vessels*
c) *Parenchyma* d) sieve tubes

7) Sieve tubes & companion cells are the parts of _____.
a) Xylem b) Phloem
c) Parenchyam d) Sclerenchyma

8) _____ tissue transport water & nutrients within the plant.
a) Epidermal b) Meristem
c) Ground d) Vascular

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

a) Describe structure of stomata.
b) Give any two functions of epidermis.
c) Sketch & label elements of xylem.
d) Enlist types of simple tissue.
e) Give functions of Meristem.
f) Describe unicellular trichome with example.

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

a) Describe in brief epidermal tissue system.
b) Write a note on types of wood.
c) Describe Tunica-corpous theory with its significance.

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

a) Describe vascular bundles in dicot & monocot stem.
b) Give account of laticifers.
c) Describe in brief anomalous secondary growth in Dracaena stem.

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

a) Describe in detail primary structure of dicot stem with suitable diagram.
b) Give classification of meristem.

SLR-DA-126

Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - VI)
Laplace Transform (19201320)

Day & Date: Wednesday, 20-12-2023 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 to each of the following. **08**

1) If $\boldsymbol{y(x,t)}$ is function of x and $\boldsymbol{t}$ then $\boldsymbol{L\left\{\frac{dy}{dt}\right\}}$ = _____.
   a) $x\bar{y}(x,p)+y(x,0)$ b) $p\bar{y}(x,p)-y(x,0)$
   c) $p\bar{y}(x,0)+y(x,p)$ d) $p\bar{y}(x,0)-y(x,p)$

2) Find $\boldsymbol{y},\ y''+ty'-y=0$ if $\boldsymbol{y(0)=0,\ y'(0)=1}$
   a) t b) $t+1$
   c) $t-1$ d) t^2

3) If $\boldsymbol{L\{t^3e^{-3t}\}}=$ _____.
   a) $\frac{6}{(p+3)^4}$ b) $\frac{6}{(p+3)^3}$
   c) $\frac{3}{(p+3)^3}$ d) $\frac{3}{(p+3)^4}$

4) If $\boldsymbol{L\{\cosh at\}}=$ _____.
   a) $\frac{a}{p^2-a^2}$ b) $\frac{a}{p^2+a^2}$
   c) $\frac{p}{p^2-a^2}$ d) $\frac{p}{p^2+a^2}$

5) If $\boldsymbol{L^{-1}\left\{\log\left(\frac{p+3}{p+2}\right)\right\}}$ = _____.
   a) $\frac{1}{t}\left(e^{2t}-e^{3t}\right)$ b) $\frac{1}{t}\left(e^{2t}+e^{3t}\right)$
   c) $\frac{1}{t}\left(e^{-2t}-e^{-3t}\right)$ d) $\frac{1}{t}\left(e^{-2t}+e^{-3t}\right)$

6) If $L^{-1}\left\{\tan^{-1}\frac{2}{p^2}\right\}=$ _____.
   a) $\frac{2}{t}\sin t\,.\cosh t$ b) $\frac{2}{t}\sin t\,.\sinh t$
   c) $\frac{2}{t}\cos t\,.\sinh t$ d) $\frac{2}{t}\cos t\,.\cosh t$

7) If $m > 0, n > 0$ the Beta function defined as $\beta(m,n) =$ _____.

a) $\int_0^1 x^m(1-x)^n dx$ b) $\int_0^1 x^{m+1}(1-x)^n dx$

c) $\int_0^1 x^m(1-x)^{n+1} dx$ d) $\int_0^1 x^{m-1}(1-x)^{n-1} dx$

8) If $L^{-1}\{f(p)\} = f(t)$ then $L^{-1}\{f(ap)\} =$ _____.

a) $\frac{1}{a}F\left(\frac{t}{a}\right)$ b) $\frac{1}{a}F(t)$

c) $F\left(\frac{t}{a}\right)$ d) $aF\left(\frac{t}{a}\right)$

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

a) Solve $\frac{d^2y}{dt^2} + y = 0$ when $y = 1$ $\frac{dy}{dt} = 0$ when $t = 0$

b) If $(D^2+1)y = 1, t > 0$ find $L\{y\}$

c) Find $L\{t^n\}$, n is positive integer.

d) Solve $L\{e^{-2t}(3\cos 6t - 5\sin 6t)\}$

e) Find $L\{t\cos at\}$

f) Find: $L^{-1}\left\{\frac{P}{P^2+2} + \frac{6p}{p^2-16} + \frac{3}{p-3}\right\}$

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

a) If $L^{-1}\{f(p)\} = F(t)$ then $L^{-1}\{e^{-ap}f(p)\} = G(t)$ where $G(t) = \begin{cases} F(t-a) & t > a \\ 0 & t < a \end{cases}$

b) Solve $(D+1)^2 y = t$ given that $y = -3, t = 0$ and $y = -1$ when $t = 1$

c) If $L\{F(t)\} = f(p)$ then prove that $L\left\{\frac{1}{t}F(t)\right\} = \int_p^\infty f(p)dp$

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

a) Find the Laplace Transform of the function $F(t)$, where

i) $F(t) = \begin{cases} 2t & 0 \le t \le 5 \\ 1 & t > 5 \end{cases}$

ii) $F(t) = \begin{cases} \sin t & 0 < t < \pi \\ 0 & t > \pi \end{cases}$

b) Show that, $L^{-1}\left\{\frac{p^2}{p^4+4a^4}\right\} = \frac{1}{2a}(\cosh at \,.\, \sin at + \sinh at \,.\, \cos at)$

c) Let $F(t)$ be continuous for all $t \ge 0$ and be of exponential order as $t \to \infty$ and if $F'(t)$ is of class A, then $\lim_{t\to\infty} F(t) = \lim_{p\to\infty} p\, L\{F(t)$

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

a) State and prove Convolution theorem.

b) Solve

i) $(D^2 - 3D + 2)y = 1 - e^{2t}, y = 1, Dy = 0$ when $t = 0$

ii) $(D^2+1)y = \sin t \,.\, \sin 2t\,, t > 0$ if $y = 1, Dy = 0$ when $t = 0$

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Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper - VI)
Plant Metabolism (19201302)

Day & Date: Sunday, 31-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Rewrite the sentence by using correct alternative. **08**

1) Lock and key hypothesis of enzyme action was given by _____.
a) Koshland b) Fischer
c) Mendel d) Kossel

2) Glucose is a _____ sugar.
a) Triose b) Tetrose
c) Pentose d) Hexose

3) _____ enzyme is involved in biological nitrogen fixation.
a) Hydrogenase b) Nitrogenase
c) Peroxidase d) Catalase

4) Concentration of Nitrogen present in atmospheric air is _____.
a) 48% b) 58%
c) 78% d) 88%

5) Which of the following is not a plant growth Promoter _____?
a) Auxin b) Gibberellin
c) ABA d) Cytokinin

6) _____ a plant growth regulator is involved in apical dominance.
a) Auxin b) ABA
c) Gibberellin d) Ethylene

7) _____ is a micronutrient from the following.
a) N b) P
c) K d) Fe

8) Induced lit hypothesis of enzyme action was given by _____.
a) Koshland b) Fischer
c) Mendel d) Kossel

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

a) Define enzyme. Give any two examples.
b) What is biological nitrogen fixation?
c) What are plant growth regulators?
d) Enlist any four micronutrients and macronutrients.
e) What are monosaccharides?
f) What are oligosaccharides?

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

a) Give classification of enzymes.
b) Write a note on Nitrogen cycle.
c) Write a note on Discovery of Plant Growth Regulators.

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

a) Write a note on - Roles of micronutrients N & K.
b) Give broad classification of carbohydrates.
c) Write a note on physiological roles of Auxin.

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

a) Write a note on Properties of Starch.
b) Write a note on mechanism of biological Nitrogen fixation.

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Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper – V)
Electronic Circuits (19201309)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) The efficiency of full wave rectifier is _____.
a) 40.6% b) 50%
c) 81.2% d) 100%

2) The function of regulator is to _____.
a) Remove ac component
b) Convert ac in to dc voltage
c) Amplify the input signal
d) Keep the output voltage constant

3) For better stability of amplifier, the stability factor must be _____.
a) Very low b) Moderate
c) High d) Very high

4) The output resistance of _____ amplifier is very low.
a) CE b) CB
c) CC d) CS

5) Multistage amplifier is used to _____.
a) Decrease gain b) Increase gain
c) Decrease resistance d) None

6) In class C power amplifier transistor conducts for _____ of input signal.
a) less than 180° b) 180°
c) greater than 180° d) 360°

7) Noise in the amplifier _____ with negative feedback.
a) Increases b) Decreases
c) Does not change d) None

8) In Wien bridge oscillator RC network introduces _____ phase shift.
a) 0° b) 45°
c) 60° d) 90°

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

a) Define ripple factor and efficiency of rectifier.
b) Give important characteristics of transistor CC amplifier.
c) What are class A and class B power amplifiers?
d) What is the effect of negative feedback on bandwidth and distortion?
e) What are the conditions for sustained oscillations?

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

a) Phase shift oscillator
b) Direct coupled amplifier
c) Class B push pull amplifier

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

a) Explain the working of zener regulator.
b) Derive the expression for voltage gain of transistor CE amplifier.
c) Explain Hartley oscillator circuit.

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

a) What is multistage amplifier? What are different types of multistage amplifier? Explain RC coupled amplifier.
b) What is feedback? What are its types? Derive the expression for gain of amplifier with feedback.

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Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper – V)
Climatology (19201311)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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) Climatology is compounded of two _____ words, Klima + Logos.
a) Greek b) Roman
c) Indian d) American

2) About 97% of the air is concentrated in the lower _____ KM.
a) 9 b) 29
c) 19 d) 39

3) Nitrogen constituents _____ % of the total composition of the atmosphere.
a) 68.03 b) 58.03
c) 78.03 d) 88.03

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) Precipitation has been derived from _____ word.
a) Roman b) Latin
c) Greek d) Indian

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

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

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

a) Tropical cyclone
b) Monsoon
c) Meaning and definition of Climatology

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

a) Define the heat budget & explain it with suitable diagram.
b) Describes the Atmosphere.
c) What is mean by Insolation & Explain the factors affecting the distribution of Insolation.

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

a) Explain Koppen's classification of the world climate.
b) Explain the structure of the atmosphere.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper – V)
Igneous Petrology (19201315)

Day & Date: Monday, 01-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Fill in the blanks by choosing correct alternatives. **08**

1) The crystallization of three components magma can be represented by a _____ diagram.
a) rose b) histogram
c) triangular d) tetragonal

2) _____ is the range of grain size for fine grained igneous rock.
a) between 2 to 5 mm b) below 2 mm
c) above 5 mm d) below 1 mm

3) _____ rocks Solidifies at surface of Earth.
a) Plutonic b) Hypabyssal
c) Volcanic d) Intrusive

4) In crystallization of binary magma, the melting temperature of liquid _____.
a) lowers b) increase
c) same d) increase or decrease

5) Crystallization of cooling silicate melt explained by _____.
a) N.L Bowen b) Jean & Jeffary
c) Clarke d) Moulten

6) Undeveloped mineral grains of igneous rock are called _____.
a) subhedral b) euhedral
c) Anhedral d) polyhedral

7) Basalt shows mostly _____ colour.
a) mesocratic b) melanocratic
c) leucocratic d) hypermelanocratic

8) Granite rock shows crystal growth of _____.
a) Quartz & olivine b) Quartz & Augite
c) Quartz & Orthoclase d) Augite & Plagioclase

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

a) Define Differentiation.
b) Name the concordant intrusions in folded and unfolded region.
c) Difference between mineral and rock.
d) What is assimilation in magma.
e) Minerals in Syenite.
f) Minerals in Gabbro.

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

a) Granitic and Glassy Texture.
b) Vesicular and amygdaloidal Structure.
c) Pillow and Columnar Structure.

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

a) Any two discordant igneous intrusions.
b) Ropy and flow Structure.
c) Composition of magma.

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

a) Explain Differentiation by liquid immiscibility and filtration.
b) Crystallization of Binary and Tertiary magma.

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Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper - V)
Bacterial Cytology and Physiology (19201317)

Day & Date: Monday, 01-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) All cells divide at same time in _____ culture.
a) Continuous b) Stationary
c) Synchrony d) Diauxic

2) The energy content of high energy bond of ATP is _____ Kcal.
a) 7.5 b) 7.3
c) 4.7 d) 7.8

3) Heterolactic bacteria produce _____ and _____ in addition to Lactic acid.
a) CO_2 and ethanol b) CO_2 and propanol
c) CO_2 and methanol d) CO_2 and butanol

4) Basal body of flagellum of Gram-negative bacterium has _____ rings.
a) 4 b) 3
c) 2 d) 5

5) _____ is absent in cell wall of Gram-negative bacteria.
a) Peptidoglycan b) teichoic acid
c) Lipoprotein d) Phospholipid

6) The transport which takes place against concentration gradient is called _____.
a) Passive transport b) Active transport
c) Facilitated transport d) Simple diffusion

7) _____ is used to decrease the surface tension of media.
a) Calcium chloride b) Charcoal powder
c) Acetaldehyde d) Bile salt

8) The growth phase where number of cells increase exponentially is called _____ phase.
a) Lag b) Log
c) Stationary d) Death

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

a) List components of electron transport chain.
b) Carboxysomes.
c) Gas vacuole.
d) Examples of thermophiles.
e) Define: lag phase.
f) Define: Facilitated diffusion.

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

a) Cell wall of Gram-Positive bacteria.
b) Continuous growth.
c) Non-cyclic photophosphorylation.

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

a) Effect of pH on growth of Microorganism.
b) Describe the structure of flagella.
c) Describe non-nitrogenous reserve food material.

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

a) Describe sporulation process in bacteria.
b) Give an account of heteroalactic and homolactic bacteria and fermentation.

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Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper – VI)
Pulse & Switching Circuits (19201310)

Day & Date: Friday, 22-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

Q.1 Multiple choice questions **08**

1) _____ circuit is called an amplitude limiter.
a) Differentiator b) Clipper
c) Clamper d) Integrator

2) A relaxation oscillator is one which _____.
a) has two stable states b) relaxes indefinitely
c) produces non-sinusoidal output d) oscillate continuously

3) The formula for calculating the pulse width of a transistorized mono-stable Multivibrator is _____.
a) W = 0.96RC b) W = 1.1RC
c) W = RC d) W = 0.69RC

4) Astable multivibrator is formed by using _____.
a) double NAND gate b) single NAND gate
c) triple NAND gate d) All of these

5) The time for charging the capacitor from 1/3 V_{CC} to 2/3 V_{CC} in an astable multivibrator using 555 is _____.
a) 0.693 ($R_A R_B$) C b) 0.693 ($2R_A+R_B$) C
c) 0.693 (R_A+2R_B) C d) 0.693 (R_A+R_B) C

6) _____ circuit is used to block low frequencies.
a) Rectifying b) Integrating
c) Differentiating d) Clamping

7) A transistor used as a switch then it is operated in _____.
a) saturation region b) cut-off and saturation region
c) active region d) cut-off and active region

8) A monostable multivibrator circuit _____.
a) has no stable state
b) gives two output pulses for a single input pulse
c) return to its stand-by state automatically
d) has no energy storage element

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

a) State different wave-shaping circuits.
b) What is the need for time base signal?
c) Define the tum-on and turn-off time of a switching transistor.
d) Calculate the pulse width of the monostable multivibrator using IC 555 if the timing components are R = 10 KΩ and C =100μF.
e) Draw the circuit diagram of an astable multivibrator using NAND gates.

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

a) What is a clipping circuit? Explain the negative clipper circuit.
b) Explain Miller Integrator with a suitable circuit diagram.
c) Explain how BJT can be used as a switch.

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

a) Calculate the frequency of oscillation and duty cycle of the astable multivibrator using IC 555, if R_A= 4.7 KΩ, R_B= 6.8 KΩ, and C = 0.01μF.
b) Explain the working of a monostable multivibrator using IC 74121.
c) Explain the working of the battery charger circuit using IC 555.

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

a) Explain the functional block diagram of IC 555. Explain how it can be used as a voltage-controlled oscillator.
b) Explain in brief the working of UJT as a relaxation oscillator with necessary waveforms and derive an expression for sweep frequency.

SLR-DA-134

Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper – VI)
Geography of India (19201312)

Day & Date: Friday, 22-12-2023 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) _____ is the highest peak of the world.
a) Kanchenjunga b) Dhaulagiri
c) Nanga Parbat d) Mt. Everest

2) Regur soil is also known as _____ soil.
a) Red b) Laterite
c) Arid d) Black

3) The current population growth rate of India in 2022 is _____ % increase from 2021.
a) 0.95 b) 1.95
c) 2.95 d) 3.95

4) The density of population in India (2011) is _____ persons per sq km.
a) 322 b) 342
c) 362 d) 382

5) _____ has the lowest sex ratio (877) in Indian states.
a) Gujarat b) Haryana
c) Maharashtra d) Goa

6) _____ is the third largest producer of electricity in the world.
a) Pakistan b) China
c) USA d) India

7) According to the 2011 census, 79.8% of the population of India practices _____.
a) Buddhism b) Jainism
c) Hinduism d) Sikhism

8) _____ has the highest production of rice in India.
a) Maharashtra b) Orissa
c) Haryana d) West Bengal

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

a) Location of India
b) Regur Soil
c) Moist tropical forest
d) Name of any four climatic region in India
e) Name of the highest peak in India?
f) Definition of religion

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

a) Tribes
b) Sex Composition.
c) Concept of Industrial revolution.

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

a) Define the soil and explain its types?
b) Explain forest types in India?
c) Explain factors affecting the distribution and density of population?

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

a) Explain the physiographic division of India?
b) Explain the types of coal and it's distribution in India?

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper – VI)
Sedimentary and Metamorphic Petrology (19201316)

Day & Date: Tuesday, 16-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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

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

1) Which of the following is source of heat in metamorphism process?
a) Geo-thermal gradient
b) magma
c) Integration of radioactive minerals
d) all the above

2) Which of the following is not sedimentary rock?
a) sandstone b) breccia
c) shale d) slate

3) _____ facies represent High grade metamorphism.
a) Zeolite b) Granulite
c) Green schist d) Blue schist

4) Which of the following sediments represent less transportation history?
a) Angular b) Sub-rounded
c) polished d) Rounded

5) Small spherical aggregations consisting of calcium carbonates form ____.
a) pisoliths b) oolites
c) protoliths d) batholiths

6) Lamination is common in _____.
a) mudstone b) slate
c) shale d) sandstone

7) Augen is _____ structure.
a) metamorphic b) igneous
c) sedimentary d) extrusive

8) Limestone is a _____ deposit.
a) Chemical b) Ferruginous
c) Argillaceous d) All the above

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

a) Give any two names of minerals of Eclogite facies.
b) What is Dynamo-thermal metamorphism?
c) What are Arenaceous deposits?
d) Define Clastic structure.
e) Define Chemical deposits.
f) Define Metamorphic Facies.

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

a) Cross bedding structure.
b) Granulite Facies
c) Stress and Anti-stress minerals.

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

a) Describe Schistose structure.
b) Explain Conglomerate and Breccia.
c) Shape of sediments.

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

a) Define Sedimentary rocks. Describe Laterite and Bauxite.
b) Define Metamorphic rocks. Describe Marble and Slate.

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Seat No.	

Set P

B.Sc. (Semester - III) (Old) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper – VI)
Bacterial Genetics (19201318)

Day & Date: Tuesday, 16-01-2024 Max. Marks: 40
Time: 09:00 AM To 11:00 AM

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 wt, H=1, C=12, O=16, Na=23, CI=35.5)

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

1) In the Griffith experiment, why did mice die when injected with live R bacteria plus heat killed S bacteria?
a) Some of the S bacteria were still alive.
b) The R bacteria had mutated to become virulent.
c) The R bacteria had taken up the virulency "factor" from the dead S bacteria.
d) The virulency "factor" in dead S bacteria was sufficient to kill the mice.

2) Which of the following nitrogenous base is not present in DNA?
a) Thymine b) Adenine
c) Guanine d) Uracil

3) How many forms of DNA are present?
a) 2 b) 3
c) 4 d) 1

4) The fragments of DNA are joined together by which of the following enzymes?
a) Endonuclease b) DNA polymerase
c) Primase d) Ligase

5) Which of the following codon are known for termination codons or nonsense codons?
a) UAA b) AUG
c) UGA d) a and c

6) A vector that can clone only a small DNA fragment is _____.
a) cosmid b) plasmid
c) yeast artificial chromosome d) Bacterial artificial chromosome

7) The transfer of genes from one cell to another by a bacteriophage is known as _____.
a) recombination b) conjugation
c) transduction d) transformation

8) Point mutation involves _____.
a) deletion b) insertion
c) duplication d) change in single base pair

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

a) Define gene.
b) What is recon?
c) Define plasmid.
d) What is mutant?
e) Define Recombination.
f) Enzymes involved in replication.

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

a) Application of plasmid.
b) Fate of recombination.
c) Semiconservative mode of replication.

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

a) Explain mutation by physical mutagenic agent ultra violet rays.
b) Specialized transduction.
c) Watson and Crick model of DNA.

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

a) Explain in detail the genetic code.
b) Describe conjugation in detail.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Paper - VII)
Physical Chemistry (19201407)

Day & Date: Wednesday, 13-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) The distribution law is applied in _____.
a) Haber's process for the manufacture of NH_3
b) Park's process for the extraction of Ag
c) Contact process for the manufacture of H_2SO_4
d) all of these

2) Entropy change is given by the equation _____.
a) $\Delta S = \mathrm{q_{rev}T}$ b) $\Delta S = \frac{q_{rev}}{T}$
c) $\Delta S = \mathrm{q_{rev}} + \mathrm{T}$ d) $\Delta S = \mathrm{q_{rev}} - \mathrm{T}$

3) S.I unit of conductance is _____.
a) Siemen b) ohm
c) mhos d) ohm^{-1}

4) The specific conductance of an electrolyte _____ with dilution.
a) increases b) decreases
c) remains same d) None of these

5) In an isothermal irreversible process, entropy change is _____.
a) greater than zero b) less than zero
c) equal to zero d) none of these

6) For the study of the distribution law, two solvents should be _____.
a) miscible b) non-miscible
c) volatile d) reacting with each other

7) The structure NaCl belongs to _____ cubic lattice.
a) Simple cubic b) Body centered
c) face centered d) none of these

8) Three dimensional array of points in space is called _____.
a) Crystal structure b) unit cell
c) crystal lattice d) lattice plane

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

a) Explain the terms specific resistance.
b) State Nernst's distribution law.
c) Define unit cell.
d) Define entropy give its units.
e) The ionic conductance at infinite dilution of Ag^+ ions 61.92 ohm^{-1} cm^2 at 298 k. Calculate the ionic mobility of Ag^+ ion at 298 k.
f) State third law of thermodynamics.

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

a) Write a note on entropy changes in physical transformations.
b) Write a note on factors affecting on transport numbers.
c) Write short on Law of crystallography.

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

a) Iodine has the same molecular weight in water and CCI_4, when varying amounts of iodine were shaken with water and CCI_4 mixture, the following results were obtained.

CH_2O(mol/dm^3):	0.000321	0.000502	0.000762
$CCC1_4$ (mol/dm^3):	0.02736	0.04282	0.06533

Calculate the partition coefficient of iodine between water and iodine.
b) Define the specific and equivalent conductance and explain how they are related.
c) Derive Bragg's equation for inter planer distance of crystals.

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

a) Define transport number of an ion. Describe the moving boundary method. What are it advantages?
b) Define isolated system. Calculate the entropy change during melting of ice at 0°C at one atmosphere? The latent heat of fusion of ice = 422.25 Jk^{-1}/gm.

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Set P

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

Day & Date: Wednesday, 13-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

Q.1 Multiple choice question. **08**

1) The first step in Software Development Life Cycle is _____.
a) Preliminary Investigation b) System Design
c) System Testing d) System Coding

2) The most important feature of spiral model is _____.
a) Risk management b) Quality management
c) Performance management d) Efficiency management

3) Which of the following is not a phase of Prototyping model?
a) Quick Design b) Coding
c) Prototype Refinement d) Engineer Product

4) If software can run in different environments then it is _____.
a) Reliable b) User-friendly
c) Portable d) Visible

5) In the _____ normal form, a composite attribute is converted to individual attributes.
a) First b) Second
c) Third d) Fourth

6) Black" refers in the black box testing means _____.
a) I-O is hidden b) Design is hidden
c) User is hidden d) All of these

7) When the old system is replaced by the new system then it is called as _____ conversion.
a) Pilot Approach b) Phase in
c) Direct d) None of these

8) A decision table facilitates conditions to be related to _____.
a) Actions b) Programs
c) Tables d) Operation

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

1) What is Normalization?
2) What is System?
3) What is the purpose of DFD?
4) What are the types of software maintenance?
5) What are the types of decision table?
6) What is Software Testing?

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

1) Questionnaire.
2) Draw a system flowchart for College admission system.
3) Waterfall Model.

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

1) Explain following qualities of software:
i) Robustness ii) Reliability
2) Differentiate between Logical DFD and Physical DFD.
3) Draw a Decision tree for following case study
A Co-operative bank XYZ will grant loans under the following conditions:
i) If a customer has an account with the bank and has no loan outstanding, loan will be granted.
ii) If a customer has an account with the bank but some amount is outstanding from previous loan, then loan will be granted if special management approval is obtained.
iii) Reject loan application in all other cases

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

1) Define the term Entity, Attribute and Relationship. Explain types of relationship with example.
2) Draw a CLD and first level DFD for Payroll system.

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Set P

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

Day & Date: Thursday, 14-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagram and give equations wherever necessary.
4) Use of logarithmic table and calculator is allowed.
(At. Wts.: H=1, C=12, 0=16, N= 14. Na =23,' Cl = 35

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

1) Methyl orange is red in acidic medium and yellow in basic medium means, methyl orange is _____ colour indicator.
a) one b) tri
c) acidic d) two

2) The contamination of ppt is caused due to _____.
a) ignition b) nucleation
c) post-precipitation d) peptiztion

3) In Haber's process _____ used catalyst and _____ as promoter
a) Fe_2O_3 , Cu b) Fe_2O_3 , Mo
c) Fe_2O_3 , Mn d) Al. K

4) Froth flotation method used for the concentration of _____ ores.
a) sulphide b) oxide
c) nitrate d) native

5) Which is the best suitable indicator for weak acid against strong base titration?
a) phenolphthalein b) methyl orange
c) methyl red d) None of these

6) Aluminum hydroxide is a _____ precipitate.
a) crystalline b) gelatinous
c) amorphous d) porous

7) Oleum is nothing but _____.
a) phosphoric acid b) pure sulphuric acid
c) pyro sulphuric acid d) All of these

8) Bauxite is an ore of _____.
a) Cu b) Fe
c) Zn d) Al

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

a) Define titrand and equivalence point.
b) Write the structure of disodium salt of EDTA.
c) Define post-precipitation with suitable example.
d) Write any two conditions of good precipitation.
e) Alloy steels are called as special steels, why?
f) Define calcination with example

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

a) Magnetic separation method.
b) Bessemer process.
c) Colour change interval or pH transition range of an indicator

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

a) What do you understand by the process of digestion?
b) Draw the diagram of manufacture of sulphuric acid by contact process.
c) Discuss in brief electrolytic reduction of aluminum.

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

a) On the basis of neutralization curve, explain the choice of indicator for strong acid vs strong base titration.
b) Discuss the physico-chemical parameters involved in manufacture of ammonia by Haber's process.

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Set P

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

Day & Date: Thursday, 14-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) DBMS stands for _____.
a) Database Administrator System
b) Database Management System
c) Database Basic Management System
d) Data Basic Management System

2) Architecture of the database can be viewed as _____.
a) Two levels b) One levels
c) Four levels d) Three level

3) DBMS is _____.
a) A collection of the data only
b) A collection of interrelated data and set of programs to access those data
c) A collection of the program
d) A collection of the software

4) Which user can interact with system without writing Application Programming?
a) Naive User b) Sophisticated User
c) Application Programer d) Specialized User

5) Storing same data in many places is called ____.
a) Iteration b) Concurrency
c) Redundancy d) Enumeration

6) In order to add a new column to an existing table in SQL, we can use the command.
a) MODIFY TABLE b) EDIT TABLE
c) ALTER TABLE d) ALTER COLUMNS

7) BCNF Stands for _____.
a) Boyce - Codd Normal Form
b) Binary Coded Normal Form
c) Bit Code Normal Form
d) Boyce Codd Natural Form

8) The term attribute refers to a _____ of a table
a) Record b) Tuple
c) Key d) Column

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

a) What is Data model?
b) What are the Relational Algebra operations?
c) What is attribute?
d) Difference between File system and DBMS.
e) What is super key?
f) What is procedure?

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

a) MySQL Architecture
b) Normalization
c) Data types in MySQL

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

a) Explain key constraints.
b) What is index? explain types of indexing.
c) Explain advantages and disadvantages of DBMS.

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

a) What is cursor and explain its types.
b) Write an PL/SQL block to check given number is even or odd.

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B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - VII)
Optics (19201434)

Day & Date: Friday, 15-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) The distance of an object and its image from the equivalent focal points are 8 cm and 2 cm respectively for a thick lens in air medium; then by calculations the focal length of thick lens is _____.
a) 2 cm b) 4 cm
c) 8 cm d) 16 cm

2) $\mu_1 y_1 \tan\theta_1 = \mu_2 y_2 \tan\theta_2$ is equation of _____.
a) Einstein b) Newton
c) Lagrange d) Gauss

3) _____ is an example of division of amplitude.
a) Young's double slit b) Fresnel biprism
c) Lloyd's mirror d) Michelson Interferometer

4) There are _____ types of diffraction.
a) 1 b) 2
c) 3 d) 4

5) LCDs are widely used for _____ reading.
a) only numerical b) alphabet
c) non-numerical d) alphanumerical

6) If the curve shows a distinct dip in the middle of two central maxima, then it is called as _____.
a) just resolved b) not resolved
c) resolved d) zero intensity wavelength

7) _____ is used to determine specific rotation of sugar solution.
a) Interferometer b) Polarimeter
c) Optical bench d) Spectrometer

8) If a prism having a base 6 cm and the rate of change of RI with respect to wavelength is 1100. Then RP of a prism is _____.
a) 6000 b) 6500
c) 6600 d) 6700

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

a) Distinguish between geometrical and spectral resolution.
b) Define lateral and axial magnification.
c) Distinguish between interference and diffraction.
d) In Michelson interferometer when movable mirror M1 is shifted by a distance 0.030 mm, a fringe shift of 100 fringes is observed. Calculate the wavelength of light used.
e) Draw the neat labelled block diagram of fibre optical telecommunication system.
f) A 10% sugar solution taken in a polarimeter tube of length 20 cm rotates the plane of polarization of the light of wavelength 5500 Á through 16^0. Calculate the specific rotation of sugar.

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

a) Write a note on superiority of Fabry-Perot interferometer over Michelson's interferometer.
b) Write a note on Nicol's prism.
c) Write a note on distinction between magnification and resolution.

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

a) Show that longitudinal magnification is proportional to the square of lateral magnification.
b) Obtain the equation of wavelength of light using Michelson's interferometer.
c) State and explain the basic postulates of Huygens to explain the phenomenon of double refraction in uniaxial crystal.

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

a) Obtain the equation for resolving power of a plane diffraction grating.
b) What is optical fibre? Give structure of fibre and types fibres.

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Set P

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

Day & Date: Friday, 15-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) The study of energy relationships and conversions in biological systems is called as _____.
   a) biophysics b) biotechnology
   c) bioenergetics d) microbiology

2) Most body water is located in _____.
   a) Plasma
   b) intestinal fluid
   c) Cells
   d) lumens of organs open to the outside

3) Which of the following is an essential amino acid?
   a) cysteine b) asparagine
   c) glutamine d) phenylalanine

4) _____ is a chemical link between catabolism and anabolism.
   a) AMP b) ADP
   c) ATP d) All of these

5) A bomb colorimeter is used to calculate the heat of reaction at a constant _____.
   a) volume b) pressure
   c) temperature d) colorimeter

6) _____ is the catabolic end product of pyrimidine nucleotide.
   a) uric acid b) NH_3
   c) CO_2 d) NH_3 and CO_2

7) The primary route for water loss from the body is the _____ system.
   a) respiratory b) urinary
   c) digestive d) cardiovascular

8) The enzymes for β-oxidation are present in _____.
   a) nucleus b) cytosol
   c) mitochondria d) golgi apparatus

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

1) What is pH regulation?
2) Define deamination.
3) What is lipid metabolism?
4) Write sources of the atoms in the purine molecules.
5) What is respiratory chain?
6) Write two disorders of acid-base balance.

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

1) Write note on chemiosmotic coupling hypothesis.
2) Write note on ethanol fermentation.
3) Explain phosphate buffer system of blood in body.

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

1) Write the significance of BMR.
2) Explain β-oxidation of palmitic acid.
3) Write note on exergonic reactions.

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

1) What is carbohydrate metabolism? Explain Lactic acid fermentation and TCA cycle.
2) Explain calorific values of food and its measurement. Which factors effecting BMR?

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
PLANT PROTECTION (Paper - VII)
Introduction to Weeds & Non Insect Pests (19201437)

Day & Date: Friday, 15-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) Weeds are classified on the basis of _____.
   a) Crop association b) Ecology
   c) Ontogeny d) All of these

2) _____ is a poisonous weed.
   a) *Loranthus* b) *Eichhornia*
   c) *Striga* d) *Datura*

3) Ploughing and Hoeing are _____ methods of weed control.
   a) Cultural b) Biological
   c) Chemical d) All of these

4) _____ are non-Insect pests.
   a) Mites b) Birds
   c) Nematodes d) All of these

5) _____ is partial root parasite found on Jowar Plant.
   a) *Striga* b) *Orobanche*
   c) *Cuscutta* d) *Viscum*

6) *Cynadon dactylon* is also known as _____.
   a) Doob b) Devils grass
   c) Bermuda grass d) All of these

7) *Eichhornia crassipes* is commonly known as _____.
   a) Water Lettuce b) Water cabbage
   c) Water hyacinth d) Morning glory

8) _____ is commonly called as Asthma weed.
   a) *Argemone Mexicana* b) *Euphorbia hirta*
   c) *Cyperus rotundus* d) *Amaranthus spinosus*

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

1) What is field sanitation?
2) Mention the damage caused by birds.
3) Write the morphology of Mites.
4) Write the damage caused by Rats.
5) State the agents of weed dispersal.
6) Write properties & use of Mira-71.

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

1) Aquatic weeds
2) Nematodes
3) 2,4-D

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

1) Explain the weed *Parthenium hysterophorus* w.r.t. morphology, dispersal and management.
2) Write an account of Biological weed management.
3) What is crop rotation? How is it beneficial?

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

1) Define weed. Describe the losses caused by weeds.
2) Write the classification of weeds based on Ecology and crop association.

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Seat No.		Set	P

B.Sc. (Semester – IV) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper – VIII)
Modern Physics(19201435)

Day & Date: Saturday, 16-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Relativity involves the relation between _____.
a) Space and time
b) Mass and energy
c) Space and time as well as mass and energy
d) Mass and time

2) According to relativity, as velocity increases then length of rod _____ in the direction of motion.
a) contracts b) elongates
c) remain constant d) varies

3) The Wavelength of matter waves is independent of _____.
a) mass b) velocity
c) charge d) momentum

4) If the particle velocity is $\frac{c}{2}$, then the phase velocity of the wave associated with the particle is _____.
a) $\frac{c}{2}$ b) $2C$
c) $\frac{2}{c}$ d) $\frac{c}{4}$

5) Normal Zeeman effect produces when external magnetic field applied to spectral line is _____.
a) weak b) strong
c) reversed d) zero

6) The magnitude of spin quantum number is always _____.
a) 1 b) $\frac{1}{2}$
c) $-\frac{1}{2}$ d) 0

7) In Compton scattering the wavelength of scattered radiations _____.
a) Decreases b) Increases
c) Remains same d) Becomes zero

8) Energy released per fission of U^{235} is about _____.
a) 50 MeV b) 200 MeV
c) 500 MeV d) 100 MeV

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

a) State the postulates are special theory of relativity.
b) 1 m rod is kept in a satellite with its length along the direction of motion. If the satellite has velocity 0.8C. Calculate the length of the rod measured by an observer in the stationary orbit.
c) What is nuclear fission?
d) State Hunds rule.
e) What is Compton wavelength?
f) A body of mass 1 kg is moving with a velocity of 15 m/s. Find its De Broglie wavelength. (Given, h = 6.62 x 10^{-34} JS).

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

a) State and explain Heisenberg's uncertainity principle relating position and momentum.
b) Write a note on total angular momentum.
c) In compton scattering the incident photons have wavelength 3 A^0. Calculate the wavelength scatter radiation if they are viewed at an angle of 60° to the direction of incidence. [Given, h = 6.62 x 10^{-34}JS, m_0 = 9.1 x 10^{-31} Kg, C = 3 x 10^8 m/s].

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

a) Discuss in detail chain reaction.
b) Explain how Bohrs quantum condition for atomic structure can be obtained on the basis of matter waves.
c) At what velocity the mass of the particle will be 10 times of its rest mass.

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

a) Derive the relativistic formula for the variation of mass with velocity.
b) What is normal Zeeman effect? Explain the effect using the magnetic orbital quantum number.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
BIO-CHEMISTRY (Paper - IV)
Molecular Biochemistry & Diseases (19201405)

Day & Date: Saturday, 16-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) Cancer cells can easily be destroyed by radiation due to _____.
   a) fast mutation b) rapid cell division
   c) lack of mutation d) lack of oxygen

2) During a lifetime _____ immunity is obtained.
   a) active immunity b) acquired immunity
   c) passive immunity d) acute immunity

3) HIV is a _____.
   a) papillomavirus b) gallivirus
   c) capripoxvirus d) lentivirus

4) The information retrieval tool of NCBI GenBank is _____.
   a) Entrez b) STAG
   c) Sequin d) Text search

5) The pancreas produce insulin by _____.
   a) α –cells b) β –cells
   c) leydig cells d) interstitial cells

6) A component of prokaryotic cells _____.
   a) plasma membrane b) DNA
   c) cytoplasm d) all of these

7) RNA used as a template for reverse transcription is _____.
   a) mRNA b) rRNA
   c) tRNA d) cRNA

8) The hormone responsible for hypoglycemia is _____.
   a) insulin b) glucagon
   c) growth hormone d) both a and c

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

a) What is enzyme activity?
b) What is gene cloning?
c) What are hyperglycemia and hypoglycemia?
d) Write two applications of gene engineering
e) What radiant energy?
f) Write two factors stimulating insulin secretion.

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

a) Explain concept of activation energy in enzyme catalyzed reaction.
b) Write note on tumor markers.
c) Write note preparation of c-DNA.

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

a) Explain Translation in prokaryotes.
b) Write note on Lysis of CD4 cells.
c) Write note on two Hypoglycemic drugs.

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

a) What is Lineweaver Burk plot. Explain enzyme inhibition- competitive and non-competitive inhibition
b) What is Transcription in prokaryotes? Explain regulation of gene expression: constitutive & inducible genes.

SLR-DA-147

Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov - 2023
PLANT PROTECTION (Paper – VIII)
Insect Pests and Their Management (19201438)

Day & Date: Saturday, 16-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

Q.1 Multiple Choice Question. **08**

1) _____ spoil the seeds in pod and lower the quality.
a) Aspergillus b) Mucor
c) Rhizopus d) All of these

2) In _____ late blight of potato caused by Phytopthora fungus in Ireland.
a) 1840 b) 1930
c) 1850 d) 1860

3) Chewing is the example of _____.
a) nature of damage b) mouth parts
c) Metamorphosis d) all of these

4) Any change in structure and appearance of animal between birth and maturity is known as _____.
a) mouth parts b) nature of damage
c) metamorphosis d) all of these

5) Stem borer is the example of _____ crop.
a) Jowar b) Sugarcane
c) Groundnut d) Gram

6) Wooly aphids damage the crop like _____.
a) Sugarcane b) Rose
c) Tomato d) Mango

7) The chemical substances used to make male sterile is known as _____.
a) Attractant b) Repellent
c) Chemosterilant d) Pheromones

8) White grubs is the example of _____ crop.
a) jowar b) sugarcane
c) brinjal d) groundnut

Q.2 Answer any four of the following. (Any Four) **08**

a) Define management.
b) Give the definition of qualitative.
c) What is emulsifiable?
d) Define dust.
e) Give the two control measures of Tomato.
f) Write the two control measures of Brinjal.

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

a) Wings
b) Rice Weevil
c) Plant origin insecticides

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

a) Explain the Antifeedents studied by you.
b) Describe the classification based on mode of action.
c) Write mark of identification and life cycle of Rose.

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

a) Describe the Gram insect pest in details.
b) Give the classification of insect pests based on the nature of damage.

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Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - VII)
Probability Distributions - II (19201443)

Day & Date: Sunday, 17-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) Let X have exp(θ) distribution, then c. d. f. of X is _____.
   a) $e^{-\theta X}$ b) $1-e^{-\theta X}$
   c) $1-e^{-X/\theta}$ d) $e^{-X/\theta}$

2) If X have $U[2,4]$, then $E(x)$ is _____.
   a) 3 b) 4
   c) 2 d) 1

3) If X follows $N(0,1)$, then $P(X<0)$ is _____.
   a) 0.5 b) 0
   c) 1 d) None of these

4) If $X \sim \beta_{II}(m,n)$ then distribution of $\frac{1}{X}$ is _____.
   a) $\beta_{II}(n,m)$ b) $\beta_{I}(m,n)$
   c) $\beta_{II}(m,n)$ d) None of these

5) If $X \sim N(10,9)$, then the height of the normal probability curve is highest at _____.
   a) 10 b) 9
   c) 0 d) None of these

6) If $X \sim G(\alpha,\lambda)$, then $E(X)$ is _____.
   a) $\frac{\lambda}{\alpha}$ b) $\frac{\lambda}{\alpha 2}$
   c) $\frac{1}{\alpha}$ d) None of these

7) If X have chi-square variate with n d. f. then $E(X)$ is _____.
   a) 2n b) n
   c) n^2 d) None of these

8) If $X \sim N(2,3)$ and $Y \sim N(3,4)$ and X & Y are independent then $X+Y$ have _____.
   a) $N(5,1)$ b) $N(5,7)$
   c) $N(2,3)$ d) $N(3,4)$

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

1) State mean and variance of exp(θ) distribution.
2) Write p. d. f. of $\mathrm{N}(\mu, \sigma^2)$ distribution.
3) State relation between $\beta_I\ (m,n)$ & $\beta_{II}\ (m,n)$ distributions.
4) What is the mode of chi-square variate with n. d. f.
5) Write c. d. f. of $U[a,b]$ distribution.

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

1) State and prove additive property of $\mathrm{N}(\mu, \sigma^2)$ distribution.
2) Find harmonic mean of beta distribution of second kind.
3) Find c. d. f. of exp(θ) distribution.

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

1) Prove that sum of iid exponential variate is a gamma variate.
2) If X have $\mathrm{N}(\mu, \sigma^2)$ variate, then find distribution of $aX + b$.
3) Find mode of student's t- distribution with n d. f.

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

1) If $X \sim \beta_{II}\ (m,n)$, then find distribution of $\frac{X}{X+1}$
2) Find mean and variance of $G(\alpha, \lambda)$ distribution.

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Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
METEOROLOGY (Paper – III)
Applied Climatology (19201431)

Day & Date: Sunday, 17-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat 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 speed the pressure gradient is _____.
   a) gentle b) moderate
   c) steep d) vertical

6) The last WMO is headquartered in _____.
   a) Washinton D.C b) Geneva
   c) Pune d) Melborne

7) The ____ heat island are formed due to additional of heat from automobile.
   a) hamlet b) rural
   c) urban d) village

8) _____ is essential for plant growth.
   a) Air b) Temp
   c) Water d) Fertilizer

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

a) What is a local wind?
b) Important of urban climate.
c) Human body comfort.
d) What is Physiological response?
e) What is means by Pressure gradient?
f) Weather forecasting.

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

a) Effects of local wind.
b) What are rotational forces?
c) Human comfort.

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

a) Write the effect of urban climate on body comfort.
b) Explain the importance of climatic studies in industrial development.
c) State the importance of temperature in physiological response.

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

a) Describe the importance of weather in transportation.
b) Explain the method of weather forecasting.

SLR-DA-150

Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
GEO-CHEMISTRY (Paper – III)
Principles of Geochemistry (19201419)

Day & Date : Sunday, 17-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) Le Chatelier principle is applicable to _____.
   a) heterogeneous reaction b) irreversible reaction
   c) homogeneous reaction d) system in equilibrium

2) Rock formed shale from _____.
   a) sand sized material b) plant remains
   c) clay minerals d) carbonate

3) Hydrolysis of Na_2CO_3 gives _____.
   a) $NaCl$ b) H_2O
   c) HCl d) $NaOH$

4) _____ is not a waterborne disease.
   a) Measles b) Typhoid
   c) Cholera d) Diarrhea

5) Coal is formed from _____.
   a) natural gas b) oil
   c) lime stone d) preserved plant material

6) In law of mass action, the 'C' term denotes _____.
   a) concentration b) moles
   c) mole fractions d) celcius

7) In conjugate acid-base pair, there is a difference of _____.
   a) only one proton b) two protons
   c) no protons d) one proton and one -OH group

8) Very low BOD level of a water body indicates the water is _____.
   a) less polluted b) highly polluted
   c) contains more organic matter d) rich in heavy metals

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

a) What is ionic concentration?
b) In which forms carbon is stored in rocks?
c) What is chemical equilibrium?
d) What are the major water pollutants?
e) What is law of mass action?
f) What is black shale made of?

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

a) Write the geological usages of acids and bases.
b) Explain carbon compounds as reducing agents.
c) Write note on organic matter in black shale.

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

a) Explain treatment on water pollutant by chemical oxygen demand (COD).
b) What is water pollution, explain TDS.
c) Explain chemical equilibrium in case of calcium sulphate.

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

a) What is chemical equilibrium? Explain it with hydrogen chloride and CO_2 in water.
b) What are acids and bases? Explain hydrolysis of Na_2CO_3 and Estimation of ionic concentration.

SLR-DA-151

Seat No.	

Set P

B.Sc. (Semester – IV) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Paper – VII)
Fundamentals of Biochemistry (19201446)

Day & Date : Sunday, 17-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

Q.1 Multiple choice Questions. **08**

1) Carbohydrates are also known as _____.
   a) Hydrates of carbon b) Carbonates
   c) Glycolipids d) Polysaccharides

2) Lipids are _____ in water.
   a) Soluble b) Partially soluble
   c) Insoluble d) Partially insoluble

3) The monomeric unit of nucleic acid are called _____.
   a) Nucleotides b) Nucleosides
   c) Pyrimidines d) Purines

4) _____ is the pyrimidine base which is found in RNA but not in DNA.
   a) Thymine b) Uracil
   c) Adenine d) Guanine

5) A _____ is a biocatalyst that increases the rate of the reaction without being changed.
   a) Aluminum oxide b) Silicon dioxide
   c) Enzyme d) Hydrogen peroxide

6) Enzyme are _____ in nature.
   a) Vitamin b) Lipid
   c) Carbohydrate d) Protein

7) Synthesis of antibodies takes place by _____ cells.
   a) Bone marrow cells b) T-cells
   c) B-cells d) Lymph

8) The basic structure of antibodies are _____.
   a) Y-shaped b) X-shaped
   c) Linear d) Hyperbolic

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

a) Draw Structure glucose.
b) Define Isozymes.
c) Give general formula of amino acid.
d) Enlist types of nucleotide bases.
e) Define saturated fatty acids.
f) Define Co-factors.

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

a) Explain Factors affecting enzyme activity.
b) Describe Simple and conjugate proteins with examples.
c) Describe Classes and biological significance of Immunoglobulins.

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

a) Describe Structure of DNA.
b) Structure and biological Significance of phospholipids.
c) Discuss mechanism of translation in prokaryotes.

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

a) Describe in detail DNA replication and add a note on its significance.
b) Describe properties of enzyme and explain mechanism of enzyme action.

SLR-DA-152

Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Paper - VIII)
Applied Statistics (19201444)

Day & Date: Monday, 18-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
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) Test of hypothesis $\mathrm{H}_0: \mu = 60$ vs $\mathrm{H}_1: \mu < 60$ leads to _____.
   a) one tailed right tailed test b) two tailed test
   c) one tailed left tailed test d) None of these

4) Type - II error is _____.
   a) Rejecting H_0 when H_0 is wrong
   b) Rejecting H_0 when H_0 is true
   c) Accepting H_0 when H_0 is wrong
   d) Accepting H_0 when H_0 is true

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 Chebycheve's inequality can be stated as $\mathrm{P}[\,|X - E(X)| \geq \mathrm{C}] \leq \frac{V(X)}{C^2}$ provided _____.
   a) $V(X) < \infty$ b) $V(X) < \mathrm{C}^2$
   c) both a and b d) neither a nor b

8) If Xi are iid$\mathrm{N}(0,1)$ r.v.s., then limiting distribution of $\mathrm{Z} =$ _____ is $\mathrm{N}(0,1)$.
   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**

a) Define Null Hypothesis.
b) Define Type-I error.
c) Explain One-tailed test.
d) State Central limit theorem.
e) Define CBR.

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

a) Describe the procedure to test for testing population mean $\mu = \mu_0$ based on t- distribution.
b) Describe the large sample test for testing the equality of means $\mu_1 = \mu_2$.
c) Define 'Time series' and give illustrations of time series from various fields.

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

a) Define General Fertility Rate (GFR). Also state the merits and demerits of GFR.
b) Explain the test procedure for testing the goodness of fit.
c) For the distribution with pmf $\mathrm{p(x)} = 2^{-\mathrm{X}}\ \mathrm{X} = 1, 2, 3, \ldots$; prove that Chebycheve's inequality gives $\mathrm{P}(|\mathrm{X} - 2| \leq 2) \geq \frac{1}{2}$, while the actual probability is $\frac{15}{16}$

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

a) For the 2×2 contingency table, prove that the chi-square test for independence given

$$\chi^2 = \frac{N(ad - bc)^2}{(a + c)(b + d)(a + b)(c + d)}$$

b) Explain the method of simple averages for obtaining indices of seasonal variations. Discuss its merits, demerits.

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Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination- Oct/Nov-2023
METEOROLOGY (Paper – IV)
Meteorological Instruments (19201432)

Day & Date: Monday, 18-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
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 non-uniform over the observatory
d) the rainfall is uniform over the observatory only

2) Non-recording rain gauge is also called as _____.
a) P-I-S b) ORG
c) Psychrometer d) Hygrometer

3) On Celsius scale ice point is at _____.
a) 0°C b) 100 °C
c) 0 K d) - 273 °C

4) How much will be atmospheric pressure if height of mercury column in the Fortins barometer is 760 *mm?*
a) 500 mb b) 1013 mb
c) 700 mb d) 1200 mb

5) Which of the following is correct formula for atmospheric pressure?
a) $P = \rho g z$ b) $P = -\rho g z$
c) $\frac{dp}{dz} = \rho g$ d) $\frac{dp}{dz} = -\rho g$

6) Wind is _____.
a) Atmosphere in motion b) weather in motion
c) climate in motion d) none of these

7) Which of the following anemometer works on pressure exerted by the wind?
a) Hooks anemometer
b) cup anemometer
c) wind vane
d) both Hooks anemometer and cup anemometer

8) Which of the following instrument is used to detect the radiations?
a) Anemometer b) wind vane
c) Crooke's radiometer d) Radiation pyrometer

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

a) What is precipitation?
b) Obtain interrelation between different temperature scales.
c) Why mercury is used in thermometer?
d) Calculate atmospheric pressure in mb if reading of Fortin's barometer is 27 inches.
e) What are advantages of anemograph over an anemometer
f) Draw neat diagram Crookes radiometer

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

a) With neat diagram explain construction and working of ordinary rain gauge
b) With neat diagram explain construction and working of mercury barometer.
c) Write a note on dry and wet bulb thermometer

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

a) With neat diagram explain construction and working of float gauge.
b) Draw neat labelled diagram of Aneroid barometer. Describe its construction and working
c) With neat diagram explain thermopile.

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

a) With neat labelled diagram, describe maximum and minimum thermometer.
b) With neat diagram explain Cup anemometer. How are its constants determined?

SLR-DA-154

Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
GEO-CHEMISTRY (Paper-IV)
Chemistry of the Earth (19201420)

Day & Date: Monday, 18-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat 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) The Eh - Ph diagrams were first proposed by _____.
a) Krumbien & Garrel b) Sloss & Garret
c) Pettijohn d) None of the above

2) _____ mineral has an Si: Al ratio about 2:1, form in neutral or slightly alkaline environment from ferromagnesium, calcic feldspar minerals and especially volcanic ash.
a) Kaolinite b) Illite
c) Montmorillonite d) Chlorite

3) The most susceptible mineral to chemical weathering is _____.
a) Na-Plagioclase b) Talc
c) Ca-Plagioclase d) Quartz

4) Pyroxene mineral convert to _____ mineral by oxidation and hydration.
a) Kaolinite b) Smectite
c) Goethite d) Calcite

5) According to Goldsmidth, clay mineral is classified as _____.
a) Resistates b) Hydrolysates
c) Oxidates d) Evaporates

6) The process involving gain of electrons is known as _____.
a) oxidation b) reduction
c) potential d) reductant

7) An alpha particles is same as?
a) A helium nucleus b) A hydrogen nucleus
c) A proton d) A positron

8) Under highly oxidizing environment, which of the following is stable phase at all pH range.
a) MnO_2 b) $Mn(OH)_2$
c) $MnOOH$ d) Mn_2O_4

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

a) Define ionic potential.
b) Which is the first solid to separate from sea water by evaporation under natural condition:
c) Name the two types of clay structure.
d) Give two methods of radioactive dating used to determine the age older rocks.
e) The transformation from parent rock to soil is generally accompanied by:
f) Name any two pollutants of air pollution

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

a) Explain physicochemical system of the earth.
b) Discuss in brief the characteristic of Kaolinite clay mineral.
c) Describe in short the causes of soil pollution.

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

a) Explain the factors affecting the rate of formation of soil with neat labeled diagram.
b) Write short note on Geochronology.
c) Describe in short oxidation and reduction potential

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

a) Explain in brief formation, structure and types of clay minerals with suitable diagram
b) Discuss in brief the Eh-pH diagram in natural environment.

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Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov - 2023
ZOOLOGY (Paper–VIII)
Animal Physiology: Controlling and Coordinating Systems (19201447)

Day & Date: Monday, 18-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) The inner most layer of stomach is called _____.
   a) serosa b) muscularis mucosa
   c) lamina porpia d) mucosa

2) IVF stands for _____.
   a) In Vitro Fertilization b) In Vitro Fermentation
   c) In Vivo Fertilization d) Inverted Fertilization

3) _____ is the endocrine as well as exocrine gland,
   a) Thyroid b) Pancreas
   c) Salivary d) Testis

4) The secretions of _____ glands differs between males and females.
   a) Adrenal b) Parathyroid
   c) Gonadal d) Pancreases

5) Bowman's capsule is formed of _____.
   a) Cuboidal epithelium b) Ciliated epithelium
   c) Squamous epithelium d) Columnar epithelium

6) _____ is the fluid connective tissue.
   a) Blood b) Lymph
   c) Serum d) Plasma

7) The structural and functional unit of nervous system is _____.
   a) Podocyte b) Neuron
   c) Lymphocyte d) Monocyte

8) _____ is the intrauterine device (IUD)
   a) Pill b) Gel
   c) Copper-T d) Foam

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

a) Functions of epithelium
b) Progesterone and its functions
c) Copper-T
d) Adrenal disorders
e) Cardiac muscle
f) Functions of blood

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

a) Explain In vitro fertilization (IVF).
b) Explain Male sex hormones.
c) Explain simple sqamous epithelium.

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

a) Explain Synaptic transmission.
b) Describe histology of tooth.
c) Explain ultra structure of skeletal muscle.

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

a) Give an account of hormones of pituitary gland
b) Define tissue, describe the different type of connective tissue.

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Seat No.	

Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - VII)
Differential Equations (19201428)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) The solution of the equation $P^2 - 7P + 12 = 0$ is _____.

a) $(y + 3x - c)\,(y - 4x - c) = 0$ b) $(y - 6x - c)\,(y - 3x - c) = 0$
c) $(y - 3x - c)\,(y - 4x - c) = 0$ d) $(y + 3x + c)\,(y + 4x - c) = 0$

2) The differential equation of the form $y = 2px + f(xp^2)$ reduces to Clairaut's form by substitution _____.

a) $x^2 = u, y^2 = v$ b) $x = u^2, y = v$
c) $x = u, y = v$ d) $x^2 = u^2, y^2 = v^2$

3) If $1 - P + Q = 0$ then the one solution of the differential equation. $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = 0$ is _____.

a) $y = e^x$ b) $y = x$
c) $y = e^{-x}$ d) $y = \sin x$

4) The equation $\frac{d^2y}{dx^2} + P\frac{dy}{dx} + Qy = R$ reduces to $\frac{d^2y}{dx^2} + Q_1 y = R_1$ by using change of independent variable method, the value of $\frac{dy}{dx}$ is _____.

a) $e^{\int p dx}$ b) $e^{\frac{1}{2}\int p dx}$
c) $e^{-\int p dx}$ d) $e^{-\frac{1}{2}\int p dx}$

5) The complementary function of the equation $x^2\frac{d^2y}{dx^2} + 2x\frac{dy}{dx} - 20y = x^2$ is _____.

a) $y = c_1x^4 + \frac{c_2}{x^5}$ b) $y = c_1x^3 + \frac{c_2}{x^2}$
c) $y = c_1x + \frac{c_2}{x}$ d) $y = \frac{c_1}{x} + c_2x^4$

6) The differential equation $\frac{d^2y}{dx^2} + \frac{1}{x^2}y = 1$ is _____ equation.

a) Homogenous linear
b) Non-homogenous
c) linear equation with constant coefficient
d) Exact differential

7) The solution of the simultaneous equation $\frac{dx}{yz} = \frac{dy}{zx} = \frac{dz}{xy}$ is _____.

a) $y = c_1x^2, z = c_2y^2$ b) $x^2 - y^2 = c_1, x^2 - z^2 = c_2$
c) $x - y = c_1, x - z = c_2$ d) $x + y = c_1, x - z = c_2$

8) The curves represented by the equation $Pdx + Qdy + Rdz = 0$ and $\frac{dx}{P} = \frac{dy}{Q} = \frac{dz}{R}$ are _____.

a) parallel b) equal

c) orthogonal d) symmetrical

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

1) Solve $P^2 + P - 12 = 0$

2) Solve $\sin px \cos y = \cos px \sin y + p$

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

4) Solve $\frac{dx}{y^2} = \frac{dy}{x^2} = \frac{dz}{x^2y^2z^2}$

5) Test the condition for the integrability for the equation $yzdx + zxdy + xydz = 0$

6) Find the known integral belonging to complementary function for the second order linear differential equation.
$x^2 \frac{d^2y}{dx^2} - 3x \frac{dy}{dx} + 3y = x^2(2x - 1)$

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

1) Solve the equation $(px^2 + y^2)(px + y) = (p + 1)^2$ using substitution $x + y = u, xy = v$

2) Explain the method of solving linear second order differential equation. $\frac{d^2y}{dx^2} + P \frac{dy}{dx} + Qy = R$ by changing the independent variable x to z.

3) Solve $\frac{dx}{mz-ny} = \frac{dy}{nx-lz} = \frac{dz}{ly-mx}$

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

1) Solve $(x + 1)^2 \frac{d^2y}{dx^2} + (x + 1) \frac{dy}{dx} - y = 2 \log (x + 1)$

2) Define Clairaut's equation and explain the method of solving it.

3) Solve:

a) $\frac{dx}{z} = \frac{dy}{-z} = \frac{dz}{z^2 + (x + y)^2}$

b) $\frac{dx}{x(y - z)} = \frac{dy}{y(z - x)} = \frac{dz}{z(x - y)}$

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

1) State and prove the necessary condition for the integrability of the differential equation $Pdx + Qdy + Rdz = 0$ where P, Q, R are functions of x, y and z, hence solve $2xdx + 2ydy + (x^2 + y^2 + e^2)dz = 0$

2) Define homogenous linear differential equation of order n, explain the method of solving it and hence solve $\frac{x^2d^2y}{dx^2} + x \frac{dy}{dx} - 4y = x^2$

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper - VII)
Plant Physiology (19201401)

Day & Date: Tuesday, 19-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) Depending upon the duration of the photoperiod, plants are classified into _____.
   a) Short Day Plants b) Long Day Plants
   c) Day Neutral Plants d) all of these

2) When P_R form of the pigment absorbs red light, it is converted into _____ form.
   a) P_R b) P_{FR}
   c) P_{ER} d) P_Q

3) Phloem unloading occurs in the _____.
   a) consumption end b) sink organs
   c) vacuoles d) both a & b

4) The movement of sugars from mesophyll cells to sieve tubes of phloem occurs through _____.
   a) symplast b) apoplast
   c) Source d) both a & b

5) In pigment system II photoreaction center is _____.
   a) P670 b) P680
   c) P640 d) P645

6) Cyclic reaction of photosynthesis occurring in the _____.
   a) IR phase b) dark phase
   c) visible d) light phase

7) During process of respiration, _____ are converted into pyruvic acid through a series of enzymatic reactions.
   a) proteins b) fats
   c) oil d) carbohydrates

8) Sucrose is converted into glucose and fructose in presence of the enzyme _____.
   a) phosphoglyceromutase b) decarboxylations
   c) invertase d) dehydrogenations

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

a) Define Photoperiodism.
b) What is Vernalization?
c) Define Photosynthesis.
d) Define Respiration.
e) What is Photorespiration?
f) What is Translocation?

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

a) Phloem loading
b) Photosynthetic apparatus
c) Site of photorespiration

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

a) Explain in brief mechanism of photorespiration.
b) Explain in brief CAM Pathway.
c) Explain in brief mechanism of translocation in phloem (Mass flow hypothesis).

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

a) Explain in detail Glycolysis.
b) Explain in detail Calvin cycle (C_3 Cycle).

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Paper - VIII)
Abstract Algebra – I (19201429)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

Q.1 Choose correct alternatives **08**

1) The inverse of i in the multiplicative group $\{1, -1, i, -i\}$ is _____.
a) 1 b) -1
c) i d) $-i$

2) The number of subgroup of group Z_{18} is _____.
a) 3 b) 6
c) 9 d) 18

3) A relation $\sim$ is transitive if for $p, q, r \in s$ _____.
a) $p \sim q, r \sim q \Rightarrow q \sim r$ b) $p \sim q, q \sim r \Rightarrow p \sim r$
c) $p \sim q, q \sim r \Rightarrow q \sim p$ d) All of these

4) For Euler's ϕ function $\phi(3600)$ is _____
a) 960 b) 900
c) 600 d) 360

5) The order of permutation $\begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 3 & 4 & 2 \end{pmatrix}$ is _____.
a) 3 b) 4
c) 5 d) 6

6) Statement A: Every cyclic group is abelian.
Statement B: The order of cyclic group is same as the order of its generator.
a) A is true, B is false b) A is false, B is true
c) Both A and B are true d) Both A and B are false

7) An onto homomorphism from group G and G' is called _____.
a) Endomorphism b) Automorphism
c) Monomorphism d) Epimorphism

8) The order of quotient group $\left(\frac{z}{5z}, +\right)$ is _____.
a) 2 b) 3
c) 5 d) Infinite

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

a) Prove that in a group G_1 the inverse of any element $a \in G$ is unique.

b) Find all x such that $0 \leq x < 6$ and $2x \equiv 4 \pmod 6$.

c) In S_3 find the order of (1 3 2)

d) Let $f: (z, +) \to (R, +)$ be defined by $f(x) = 5x \; \forall \; x \in Z$. Test f is homomorphism. If so find its Kernel.

e) Show that every subgroup of abelian group is normal.

f) Define quotient group.

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

a) For a permutation $\propto = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 1 & 4 & 3 & 2 \end{pmatrix} \beta = \begin{pmatrix} 1 & 2 & 3 & 4 \\ 3 & 1 & 4 & 2 \end{pmatrix}$
Compute $\propto \beta, \propto^{-1} \cdot \beta^{-1}, \beta^{-1} \cdot \propto^{-1}, \propto^2 \beta$

b) Find the $gcd\ (13, 31)$ and write it as linear combination of the integers $13, 31$.

c) If a and b are any elements of a group G and H be any subgroup of group G then prove that $Ha = Hb$ iff $ab^{-1} \in H$

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

a) State and prove Lagrange's theorem.

b) If G is cyclic group of order n generated by a then show that a^m is a generated of G if and only if $gcd(m, n) = 1$

c) If H and K are normal subgroup at group G then show that $H \cap K$ is also normal subgroup of G.

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

a) Define permutation and also state and prove Cayley's theorem.

b) Define homomorphism of group and also state and prove the fundamental theorem of homomorphism of group.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
BOTANY (Paper – VIII)
Embryology of Angiosperms (19201402)

Day & Date: Wednesday, 20-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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

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

1) The elongation of internode between corolla and stamen is called _____.
a) Gynophore b) Androphore
c) Anthophore d) Carpophore

2) In _____ type of ovule the micropyle, chalaza and funicle lies in straight line.
a) Anatropous b) Circinotropous
c) Orthotropous d) All of these

3) Coconut fruit is dispersed by _____.
a) Air b) Animal
c) Water d) Autochory

4) Some plants have seed with hooks for _____.
a) Dispersion b) Pollination
c) Fertilization d) Reproduction

5) Tapetum plays a function of _____ in microsporogenesis.
a) Protection b) Growth
c) Secretion d) Nutrition

6) The development of Embryo Sac in polygonum is _____.
a) Monosporic b) Bisporic
c) Tetrasporic d) Trisporic

7) _____ type of Endosperm is restricted largely to the Monocotyledons.
a) Cellular b) Helobial
c) Nuclear d) None of these

8) Free nuclear division occurs in _____ type of Endosperm.
a) Helobial b) Cellular
c) All of these d) Nuclear

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

a) Write a note on dispersal by Animals?
b) Sketch and label Orthotropous type of Ovule.
c) What is mean by Anemophily?
d) What is mean by Endosperm?
e) Define Flower?
f) Define triple fusion?

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

a) Describe nuclear type of Endosperm.
b) Explain dispersal by Explosion and write a note on mechanism of Popping.
c) Mention the evidences of flower as a modified shoot.

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

a) Mention the significance of Double fertilization.
b) Explain Abiotic factor with reference to Wind and Water dispersal.
c) Describe the types of ovules you have studied.

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

a) Describe mechanism of Double fertilization in Angiosperm.
b) Describe structure and development of Embryo in Monocotyledons.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper - VII)
Economic Geography (19201416)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) SEZ approvals granted under the SEZ Act _____.
a) 2000 b) 2005
c) 2010 d) 2015

2) Economic geography is the subfield of _____ geography.
a) Natural b) Physical
c) Human d) None of these

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) GDP means_____.
a) Gross domestic product b) Giga domestic product
c) Gross daily product d) Gram domestic product

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) The national highway No.3 joins: _____.
a) Agra with Kolkatta b) Delhi with Ahmdabad
c) Delhi with Mumbai d) Agra with Mumbai

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

a) Concept of Economic Geography
b) Fishing
c) Mining
d) Primary Activity
e) Subsistence Agriculture
f) Technology Parks

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

a) Forestry & Its uses
b) Tertiary Activity
c) SEZ

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

a) What is mean by Agriculture & Explain commercial agriculture pattern?
b) Explain the Industrial Location Theory by Alfred Weber.
c) Explain the modes of transport & it's importance in Indian economy.

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

a) Describes Vonthunen land use model with suitable diagram.
b) Define the Economic Geography & Explain the classification of economic activity.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper–VII)
Operational Amplifier and Applications (19201413)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

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

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

1) A differential amplifier can be used to amplify.
a) ac signals only b) dc signals only
c) Both ac and dc signals d) None of these

2) In op-amp IC 741, I/P and O/P pins are _____.
a) 3, 4 and 7 b) 3,2 and 6
c) 1,5 and 6 d) 1,6 and 2

3) A voltage follower has a _____.
a) High input impedance b) Low output impedance
c) Voltage gain of one d) all of these

4) As the feedback resistor value R is increased, the frequency of astable multivibrator _____
a) Increases b) Decreases
c) Remains same d) None of these

5) In phase shift oscillator, op-amp is used in _____.
a) Voltage follower mode b) Differential mode
c) Non-inverting mode d) Inverting mode

6) For a given op-amp, CMRR= 10000 and A_d= 10000, hence A_c _____.
a) 100 b) 2
c) 20 d) 1

7) Zero crossing detector is a comparator with _____.
a) Vref = +Vcc b) Vref=-VEE
c) Vref=0 Volt d) None of these

8) If input voltages to an inverting adder are V1, V2 andV3 then output voltage Vo is given by the relation _____.
a) V0 = V1 + V2 + V3 b) V0 = V1 - V2 - V3
c) V0 = - (V1 + V2 + V3) d) None of these

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

a) Draw and label the schematic symbol for op-amp.
b) State any four ideal characteristics of an op-amp.
c) Draw the circuit diagram of integrator using Op-amp.
d) What is virtual ground?
e) State different types of differential amplifier
f) Define the Op-amp parameters:
  i) Input bias current
  ii) input offset voltage

Q.3 Write short notes on (Any Two) **08**

a) Explain Op Amp as a inverting amplifier.
b) Explain Op Amp as a zero-cross detector
c) Draw functional block diagram of Op-amp. Explain function of eachblock.

Q.4 Answer the following (Any Two) **08**

a) Explain Emitter coupled differential amplifier.
b) Explain Op Amp as a summing amplifier.
c) Explain Op Amp as a Schmitt Trigger.

Q.5 Answer the following (Any One) **08**

a) Explain Op Amp as a Astable multivibrator and obtain expression for frequency.
b) Explain Op Amp as a Differentiator and obtain expression for out put voltage.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper – VII)
Stratigraphy (19201422)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat and well labeled diagram wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Select correct one. **08**

1) James Hutton has given Principle of _____.
a) Unconformity b) Discontinuity
c) Uniformitarianism d) Disconformity

2) Age of Mammal is _____ era.
a) Cenozoic b) Mesozoic
c) Proterozoic d) Ordovician

3) Bhander formation belongs to _____.
a) Vindhyan b) Dharwar
c) Cuddapah d) Deccan Trap

4) Which of the following represent oldest rocks of south India?
a) Dharwar b) Vindhyan
c) Siwaliks d) Spiti

5) Which is the following representing smallest lithostratigraphic division?
a) Group b) Super-group
c) Formation d) All the above

6) The largest chrono-stratigraphic division is _____.
a) Era b) Eon
c) Epoch d) Bed

7) Diamond deposits found in Panna region of _____ System.
a) Vindhyan b) Dharwar
c) Cuddapah d) Deccan Trap

8) Age of Delhi super group is _____.
a) Cambrian b) Precambrian
c) Silurian d) Jurassic

Q.2 Answer the following (Any Four) **08**

a) Define Index fossil.
b) Give two names of Eons.
c) Give two names of formations of Vindhyan.
d) Define Bio-stratigraphy
e) Give the distribution of Dharwar.
f) Give the name of Era representing recent life.

Q.3 Write short notes on (Any Two) **08**

a) Classification of Cuddapah.
b) Lithology and Age of Deccan Trap.
c) Uttatur formation of Trichinopoly - Lithology and Fossils.

Q.4 Answer the following (Any Two) **08**

a) Explain Himalaya - An Extra Peninsular Division
b) Economic importance of Dharwar system.
c) Inter-trapean beds.

Q.5 Answer the following (Any One) **08**

a) Define Stratigraphy. Describe Principle of Faunal Succession in stratigraphy.
b) Define Correlation. Describe any two Physical methods of stratigraphic correlation.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper - VII)
Immunology & Medical Microbiology (19201425)

Day & Date: Thursday, 21-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 Choose the correct alternative out of provided below the question and rewrite the sentence. **08**

1) _____ immunoglobulin is produced early in the primary response to infection.
a) Ig E. b) IgA.
c) Ig G. d) IgM

2) _____ is the most popular test carried on for diagnosis of enteric fever.
a) Widal. b) VDRL.
c) ELISA. d) HCV Rapid Test

3) Small chemical groups on the antigen molecule that can react with antibody is _____.
a) Epitope. b) Paratope.
c) Isotope. d) Allotope

4) _____ is called the amboceptor in complement fixation test.
a) sheep red blood cells coated with rabbit antibody
b) Antibody
c) Antigen
d) Complement

5) In Mycobacterium tuberculosis _____ is the staining method used for its diagnosis.
a) cotton blue b) acid fast
c) simple d) negative

6) In cell cytotoxicity _____ lymphocytes play role.
a) CD8 b) NK cells
c) B d) a and b

7) A common source of staphylococcus aureus in hospital is _____.
a) IV fluids b) Bed linen
c) Infected wounds d) Blood

8) The antigen antibody complex formed in precipitation is called as _____.
a) Agglutitin b) Precipitin
c) Precipitogens d) Precipitate

Q.2 Answer any four of the following. **08**

a) What is racial immunity?
b) Define hapten.
c) Define agglutination.
d) What precautions need to be taken during transportation of specimen.
e) What is immune sera?

Q.3 Write short notes on any two of the following. **08**

a) Microscopic and cultural diagnosis of diseases.
b) Complement fixation test.
c) Basic structure of antibody (Immunoglobulin).

Q.4 Answer any Two of the following. **08**

a) Factors affecting antigenicity.
b) Mechanical barriers in Innate immunity.
c) Causative agent and lab.diagnosis of UTI.

Q.5 Answer any one of the following. **08**

a) Explain in detail dengue fever.
b) Write in detail on active and passive immunity.

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B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
GEOGRAPHY (Paper – VIII)
Environmental Geography (19201417)

Day & Date: Friday, 22-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of Stencils is allowed.

Q.1 Multiple choice questions: **08**

1) _____ describes the spatial aspects of interactions between humans and the natural world.
a) Geomorphology b) Climatology
c) Environmental Geography 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 the basic input of energy entering the ecosystem.
a) Coal b) Wind
c) Solar radiation 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) _____ means a mixed community of plants and animals occupying a major geographical area on a continental scale.
a) Biome b) Ecosystem
c) Deforestation d) None of these

7) _____ gas is responsible for global warming.
a) Carbon dioxide b) Carbon monoxide
c) Oxygen d) Nitrogen

8) Marine life is in danger due to _____ pollution.
a) Air b) Land
c) Water d) Sound

Q.2 Answer any four of the following. **08**

a) What is Environmental Geography?
b) What is Ecosystem?
c) What is Food Chain?
d) What is Environmental Policy?
e) What is Pollution?
f) What is Global Warming?

Q.3 Write short notes on any two of the following. **08**

a) Major Biome of the world
b) Marine Ecosystem
c) Importance of Environmental Geography

Q.4 Answer any two of the following. **08**

a) Scope of the Environmental Geography.
b) Explain the Grassland Ecosystem.
c) Explain the Climate Changes.

Q.5 Answer any one of the following **08**

a) What is Biome? Explain the types of Aquatic Biomes?
b) What is Air Pollution? Explain the causes of Air Pollutions?

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Paper – VIII)
Digital Techniques and Microprocessor (19201414)

Day & Date: Friday, 22-12-2023 Max. Marks: 40
Time: 12:00 PM To 02:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.
4) Use of a logarithmic table and calculator is allowed.

Q.1 Multiple choice questions: **08**

1) A storage cell in DRAM is _____.
a) A capacitor b) A flip-flop
c) A fuse d) A magnetic dipolebinary

2) IC 2764 is a _____.
a) 8 KB flash memory b) 8 KB UVEPROM
c) 8 KB DRAM d) 8 KB SRAM

3) The binary equivalent weight of least significant bit in a 4-bit binary weighted method is _____.
a) 1/4 b) 1/8
c) 1/15 d) 1/16

4) The conversion time of 10-bit successive approximation type A to D converter using 1 MHz clock will be _____.
a) 1 uSec b) 4 uSec
c) 8 uSec d) 10 uSec

5) Whenever a microprocessor 8085 is resetted _____ address is loaded in program counter.
a) FFFF b) 0000
c) RST7.5 vector address d) None of these

6) Which one of these instructions represent Register addressing mode?
a) MOV D,A b) MVI C,35 H
c) LDA 8500 d) STAX D

7) _____ IC is used as a bidirectional data bus buffer.
a) 74244 b) 74373
c) 74245 d) 74138

8) The control signals generated by uP 8085 are _____.
a) Read b) Write
c) ALE d) All of these

Q.2 Answer any four of the following. **08**

a) What is the difference between volatile and non-volatile memories?
b) What is system bus?
c) What is an instruction cycle?
d) Give the concept of tristate logic.
e) Explain in short the need of interfacing.
f) Write one instruction from data transfer, arithmetic, logical and branching (or jumps) group of instructions.

Q.3 Write short notes on any two of the following. **08**

a) Write a note on memory organization.
b) Write a note on specifications of ADC and DAC.
c) Write a note on Clock and Reset circuit.

Q.4 Answer any two of the following. **08**

a) Write an Assembly Language Program to add two data bytes 48 H and 73 H, and save the result at RAM address 8550 H.
b) Draw uP 8085 interfacing diagram to interface memory chip 6264.
c) Explain R-2R ladder method of digital to analog conversion.

Q.5 Answer any one of the following. **08**

a) Draw the internal architectural block diagram of uP 8085 and explain.
b) Write an Assembly Language Program to transfer the memory block of ten data bytes to another memory block.

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Set P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Paper - VIII)
PALAEONTOLOGY (19201423)

Day & Date: Friday, 22-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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) _____ species is extinct.
a) Productus b) Turritella
c) Cardita d) Trilobites

2) Plants leaf preserved in _____ rock.
a) Argillaceous b) Arenaceous
c) Rudaceous d) Volcanic

3) The mode of preservation of fossil is _____.
a) Mould b) Caste
c) Carbonization d) All of these

4) Cardita belongs to _____.
a) Gastropoda b) Cephalopoda
c) Lamellibranchia d) Arthropoda

5) Most Mollusca are of _____ Habitats.
a) Marine b) Terrestrial
c) Freshwater d) All of these

6) Nautilus belongs to phylum _____.
a) Coelentera b) Arthropoda
c) Mollusca d) Brachiopoda

7) Fossil Ogygia belongs to _____.
a) Arthropods b) Mollusca
c) Gastropods d) All of these

8) Micraster belongs to _____.
a) Echinodermata b) Brachiopod
c) Cephalopod d) Gastropoda

Q.2 Answer any four of the following. **08**

a) Define fossil
b) Preservation of fossil in amber
c) Difference between caste and mold
d) Geological period of Trilobites
e) Any two Significance of fossils
f) Name the Gondwana flora

Q.3 Write short notes on any two of the following. **08**

a) Morphology of Turritella
b) Morphology of Productus
c) Morphology of Physa

Q.4 Answer any two of the following. **08**

a) Write evolutionary history of horse.
b) Write conditions of fossilization.
c) Morphology of Voluta.

Q.5 Answer any one of the following. **08**

a) Classification and morphology of Cardita and Goniatite.
b) Classification and morphology of Ogygia and Paradoxide.

SLR-DA-169

Seat No.		Set	P

B.Sc. (Semester - IV) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Paper–VIII)
Industrial Microbiology (19201426)

Day & Date: Friday, 22-12-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

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) Batch fermentation is also called _____.
a) Closed system b) Open system
c) Fed-Batch system d) Sub-merger system

2) Distillation is the best method to separate liquids having sufficient difference in their _____.
a) Solubility b) Melting point
c) Boiling point d) None of the above

3) Which of the following is responsible for the formation of foam?
a) Natural media b) Synthetic media
c) Complex media d) Defined media

4) What is the main purpose of Strain Improvement _____.
a) Increase the productivity
b) Increase the permeability
c) Introducing new genetic properties into the organism
d) All of these

5) Which of the following raw material is useful for the production of alcohol?
a) Sulphite waste liquor b) Molasses
c) Starch d) Alkanes

6) The best medium for the production of Penicillin is _____.
a) Nutrient agar b) Corn steep liquor
c) Sulfite waste liquor d) Whey

7) Which of these is not a product of fermentation?
a) Lactate b) Oxygen
c) Carbon dioxide d) Ethanol

8) Which of the following is NOT the technique of preservation of industrially important microorganisms?
a) Storage on agar slants b) Storage under liquid nitrogen
c) Dried cultures d) Storage in water

Q.2 Answer any four of the following. **08**

a) Define Industrial Microbiology.
b) Enlist the different parts of the fermenter.
c) What is screening?
d) Give the name of the microorganism used in Penicillin fermentation.
e) What is Media optimization?
f) Define Scale-up of Fermentation.

Q.3 Write short notes on any two of the following. **08**

a) Batch Fermentation process.
b) Inoculum Development.
c) Strain Improvement

Q.4 Answer any two of the following. **08**

a) Explain the use of waste as a fermentation media.
b) Discuss the fermentation product recovery by filtration.
c) Describe the surface culture and submerged culture methods.

Q.5 Answer any one of the following. **08**

a) Describe in detail the penicillin fermentation process.
b) Explain a typical Fermenter with its Parts and their functions.

SLR-DA-170

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
ENGLISH (Compulsory)
Literary Mindscapes - I (19201500)

Day & Date : Saturday, 02-12-2023 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 Rewrite the sentence by filling the blanks with the correct answer from the given options. 08

1) What occasion is being celebrated in the story 'The Gift of the Magi'?
a) Easter b) Christmas
c) New Year's d) Della's birthday

2) Who came to visit Phatik's mother?
a) Their grandfather b) Their uncle
c) Their aunt d) Cousin

3) The girl in the poem 'The Solitary Reaper' was _____.
a) reaping and singing b) cutting and bending
c) singing and dancing d) reaping and quarrelling

4) The Queen Gulnaar desires _____.
a) The King's attention b) more jewellary
c) a rival d) more clothes

5) The schoolmaster lives in _____.
a) cottage b) bunglow
c) mansion d) apartment

6) The 'road' in the poem of Robert Frost is the symbol of _____.
a) the difficulties of life b) the fun in life
c) the attractive aspects in life d) the choice in life

7) He has sold his car. (change the voice of this sentence)
a) His car had been sold by him b) His car has been sold by him
c) His car have being sold by him d) His car having been sold by him

8) Don't lose hope. Keep _____ and you will surely succeed. (Fill in the blanks with choosing correct phrasal verb of the following alternatives)
a) going b) going on
c) going with d) going at

Q.2 Answer the following questions. (Any Four) 12

1) Who are the Magi? Why are Della and Jim called Magi?
2) Why did Phatik suffocated in the big city?
3) Describe the use of nature and harmony in the poem 'The Solitary Reaper.'
4) Why is the Queen Gulnaar unsatisfied and seeks a rival?
5) Describe the character of the village schoolmaster.
6) What is the significance of the two roads in the poem?

Q.3 Answer the following (Any One) **10**

1) What is the importance of 21st Century skill?

OR

2) Explain the types of 21st Century skill.

Q.4 Write down long answer of the following question **10**

What are the most important learning skills of 21st century?

SLR-DA-171

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Special Paper - IX)
Mathematical Physics & Statistical Physics (19201511)

Day & Date: Sunday, 03-12-2023 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) Multiple choice questions **10**

1) Stoke's theorem gives the relation between line integral with _____.
   a) volume integral b) surface integral
   c) normal integral d) line integral

2) Divergence of vector is the total flux flowing out in the field _____.
   a) per unit area b) per unit volume
   c) per unit length d) per unit line

3) The scale factors (h_1, h_2, h_3) for spherical co-ordinate are _____.
   a) $(1, r, r\sin\theta)$ b) $(1, r, 1)$
   c) $(1, r, \sin\theta)$ d) $(1, r, r)$

4) Which of the following have dimensions of area _____
   a) h_2u_2 b) $h_1u_1h_2u_2$
   c) h_2h_2 d) $h_1u_1h_2u_2h_3u_3$

5) Five particles are distributed in two phase cells, then number of macrostates is _____.
   a) 6 b) 10
   c) 20 d) 32

6) Volume of a cell in phase-space is _____.
   a) h b) h^2
   c) h^3 d) h^4

7) Thermodynamic potential at constant volume is _____.
   a) Helmholtz free energy b) Enthalpy
   c) Gibbs free erergy d) Entropy

8) The gas molecules having rms speed of 400 °K is _____.
   a) twice the value at 100 °K b) four times the value at 100 °K
   c) half the value at 100 ° d) same at 100 °K

9) Quantum statistics is based on the idea of _____ between systems.
   a) continuous exchange of energy
   b) no exchange of energy
   c) discrete exchange of energy
   d) continuous exchange of matter

10) At absolute zero of temperature, occupation index f(u) is _____ function.
   a) linear b) exponential
   c) inverse d) step

B) State True or False. **06**

1) The order of differential equation $\frac{d^2y}{dx^2} = 6x$ is two.
2) Curl of gradient of scalar function is always zero.
3) Phase space is 3 dimensional space.
4) Maxwell Boltzmann statistics is applicable to electrons.
5) Particles obeying Fermi Dirac statistics are called Fermions.
6) Rest mass of photon is infinite.

Q.2 Solve any Eight of the following. **16**

1) Define degree and order of differential equation.
2) Write expression of gradient of scalar function in orthogonal curvilinear coordinate system.
3) Define accessible microstates.
4) Define priori probability.
5) Define most probable speed for gas molecules.
6) Obtain expression for partition function (Z) in Maxwell Boltzmann Statistics.
7) State Wein's displacement law.
8) Give properties of photons in black body radiation.
9) Define fermi energy of free electrons.
10) Write postulates of Fermi Dirac statistics.

Q.3 A) Attempt any Two of the following. **10**

1) Derive the Boltzmann relation between entropy and probability.
2) Obtain expression for total internal energy in terms of partition function Z.
3) Derive Stefan's law from Planck's radiation formula.

B) Compare Maxwell Boltzmann, Bose Einstein and Fermi Dirac Statistics. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Extend the expressions in orthogonal curvilinear coordinate system to spherical polar coordinate system.
2) Distinguish between microcanonical ensemble and canonical ensemble.
3) Explain electron contribution to the specific heat of metals.

B) Describe the experiment to study the black body radiation and discuss results of the experiment. **08**

Q.5 Attempt any Two of the following. **16**

a) State and Prove Stoke's theorem.
b) Obtain expression of curl of vector field in orthogonal curvilinear coordinate system.
c) Derive Maxwell Boltzmann distribution law.

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Seat No.	

Set P

B.Sc.(Semester-V) (New) (CBCS) Examination : Oct/Nov-2023
CHEMISTRY (Special Paper - IX)
Physical Chemistry (19201506)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw Neat diagram and give equations wherever necessary
3) Figures to right indicate full marks.
4) Use of logarithmic table/scientific calculator is allowed.

Q.1 A) Choose correct alternative and rewrite the sentence. **10**

1) The cell that converts chemical energy in to electrical energy is known as _____.
   a) electrolytic cell b) galvanic cell
   c) voltaic cell d) both b and c

2) The equation $F = C - P + 2$ represents _____.
   a) Phase equation b) Gibb's phase rule
   c) reduced phase rule d) All of these

3) In photoelectric effect kinetic energy of ejected electrons _____ with increase in wavelength.
   a) decreases b) increases
   c) remains same d) none of these

4) At a triple point _____.
   a) only temp. is fixed b) only pressure is fixed
   c) both T&P are fixed d) None of these

5) The site of reduction in galvanic cell is _____.
   a) anode b) cathode
   c) salt bride d) all of these

6) Emf of the cell at equilibrium is _____.
   a) one b) two
   c) three d) zero

7) In dissociation of hydrogen _____ acts as a sensitizer.
   a) O_2 b) CO_2
   c) H_2 d) Hg

8) In concentration cell, emf is due to difference in _____.
   a) concentration b) activity
   c) both a and b d) none of these

9) ISC means _____.
   a) intersystem crossing b) inter solution concentration
   c) internal conversion d) none of these

10) A pure metal M in contact with a solution containing M^{n+} ions represents _____.
   a) gas electrode b) metal-metal ion electrode
   c) redox electrode d) none of these

B) Fill in the blanks from the following. **06**

1) The energy E associated with each quantum for a particular radiation of a frequency υ is given by _____.
2) In photosynthesis _____ acts as a sensitizer.
3) In Nernst equation for calculation of emf of cell Q_a represents _____.
4) Any homogeneous, physically distinct and mechanically separable part of the system is called as _____.
5) The electrode $\mathrm{Zn(aq)|\ Zn(Hg)}$ is classified as _____.
6) The light emitted in chemiluminescence phenomena is also called as _____ light.

Q.2 Solve the following (Any Eight) **16**

1) State Gibb's Phase rule.
2) Give construction and representation of gas electrode.
3) What is Compton Effect?
4) Give one application of Emf measurement.
5) State Einstein's law of photochemical Equivalence.
6) Give cell reactions in Daniell cell.
7) What is Heisenberg's uncertainty principle?
8) Define metal-metal ion electrode. Give its example.
9) Define electrochemistry and electrochemical cell.
10) Define the Grotthus-Draper law and Beer's law.

Q.3 A) Attempt the following (Any Two) **10**

1) Write an account on dimerization of anthracene?
2) Derive Nernst equation for emf of cell.
3) Discuss the application of phase rule to water system.

B) Solve the Problem. **06**

Calculate emf of the following cell at 298k,
$\mathrm{Zn_{(s)}\ |Zn^{++}\ aq.\ (0.1M)\ ||\ Ag^{+}aq.\ (0.1M)\ |\ Ag_{(s)}}$
(Given: $\mathrm{E^0{}_{zn} = -0.761\ V, E^0{}_{Ag} = 0.799\ V}$ and $2.303\mathrm{RT/F} = 0.0591$)

Q.4 A) Attempt the following (Any Two) **08**

1) Write a short note on black body radiation.
2) Write note on reversible and irreversible cell.
3) Calculate the energy in joules per quantum of photon of wavelength of 600 nm.

B) Discuss in details Jablonski diagram. **08**

Q.5 Attempt the following (Any Two) **16**

a) Explain how the emf measurement may be employed to determine $\Delta\mathrm{G}, \Delta\mathrm{H}$ and ΔS.
b) State Gibb's rule and describe its application to ferric chloride-water system.
c) What is photoelectric effect? What are its characteristics?

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - IX)
Plant Systematics (19201501)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagram an give equations wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Multiple choice question **10**

1) Maize bears _____ type of root.
   a) Butressed root b) Simple root
   c) Advanticious root d) Tap root

2) Botanical names are in _____.
   a) English b) Greek
   c) Latin d) Spanish

3) If all whorls originate from the base of ovary type of flower is called as _____.
   a) Hypogynous b) Perigynous
   c) Epigynous d) All

4) Flower is _____.
   a) A other part of stem b) Modified shoot
   c) Modified root d) Central part

5) *Terminalia India* has _____ type of fruit.
   a) Berry b) Drupe
   c) Etarieo d) Lomenta

6) _____ among the following is one of the monocot family.
   a) Bignonaceae b) Malvaceae
   c) Annonaceae d) Poaceae

7) APG stands for _____.
   a) Angiosperm group b) Artificial family
   c) Phylogenetic group d) Angiosperm phylogenetic group

8) _____ is the fourth step of herbarium preparation.
   a) Collection b) Poisioning
   c) Sticking d) Pressing

9) In floral formula fusion is denoted by using _____.
   a) @ b) ( )
   c) G d) All

10) _____ is the lowermost category in classification.
   a) Family b) Order
   c) Species d) Division

B) Give definitions. **06**

1) Define inflorescence
2) Define phyllotaxy
3) Define axile placentation
4) Define Spike inflorecence
5) Define morphological characters of plant
6) Define epigynous flower

Q.2 Solve any Eight of the following. **16**

1) Give merits of APG III system of classification.
2) Draw any two types of root.
3) Draw types of flower according to position.
4) Draw a type of embricate aestivation with 5 petals.
5) Draw & define racemose inflorescence.
6) Define topological species concept.
7) Enlist vegetative characters of family liliaceae.
8) Sketch & label typical structure of flower.
9) Enlist steps of herbarium preparation.
10) Enlist reproductive characters of family Orchidaceae.

Q.3 A) Attempt any Two of the following. **10**

1) Write a note on types of inflorescence.
2) Give outline of Benthum & Hookers system of classification.
3) Write a note on aggregate fruits.

B) Write note on Lead Botanical Garden, Kolhapur. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Describe vegetative & reproductive characters of family Nyctaginaceae.
2) Write a note on leaf phyllotaxy with diagram.
3) Write in brief principles of ICBN.

B) Describe species concept with its types. **08**

Q.5 Attempt any Two of the following. **16**

a) Write distinguishing characters of family malvaceae.
b) Describe vegetative & reproductive characters of family Poaceae.
c) Describe in detail steps of herbarium preparation.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
Zoology (Special Paper - IX)
Molecular Biology (19201520)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Choose correct alternatives. **10**

1) Start codon is _____.
   a) GUG b) UUG
   c) UAG d) AUG

2) The synthesis of protein from genetic code is _____.
   a) transcription b) translation
   c) reproduction d) replication

3) Which is the source of energy for aminoacid activation?
   a) ATP b) TTP
   c) CTP d) GTP

4) _____ indicates where DNA replication happens.
   a) DNApolymerase b) Replication fork
   c) Primase d) ori C

5) RDNA contains Thymine, it is a _____.
   a) Purine b) Pyramidine
   c) Nucleoside d) Nucleotide

6) During DNA replication single strand DNA is not reannealed due to function of _____.
   a) Primase b) Helicase
   c) Topoisomerase d) Singlestrand binding protein

7) Anticodon is present in _____.
   a) DNA b) mRNA
   c) tRNA d) rRNA

8) A single strand of mRNA attached to complex of ribosomes is called _____.
   a) okazaki segments b) polysome
   c) polymer d) polypeptide

9) The term used to describe DNA copied to produce two DNA daughter molecules is _____.
   a) reproduction b) replication
   c) synthesis d) production

10) RNA is composed of repeating units of _____.
   a) ribonucleosides b) DEOXY ribonucleosides
   c) ribonucleotides d) deoxyribonucleotides

B) One sentence answer. **06**

1) miRNA
2) RNA polymerase
3) siRNAs
4) Okazaki fragment
5) RNA polymerasae
6) Transcription

Q.2 Solve the following (Any Eight) **16**

1) Structure of aminoacid
2) Wobble hypothesis
3) Deciphering genetic code
4) DNA gyrase
5) DNA ligase
6) Operon
7) RNA interference
8) Types of RNA
9) Pyrimidine dimerization
10) Differentiate between Activators and repressors

Q.3 A) Attempt the following (Any Two) **10**

1) Explain transcription in prokaryotes.
2) Give structure of tRNA add a note on amino-acyl tRNA synthetases.
3) Write short note on properties of genetic code.

B) Short note/Solve **06**

Post transcriptional modification in eukaryotes.

Q.4 A) Attempt the following (Any Two) **08**

1) Give details of wobble hypothesis.
2) Explain the mechanism of rDNA technology and its applications in medicine, agriculture & industry.
3) Describe the properties of genetic code.

B) Describe Watson and Crick model of DNA. **08**

Q.5 Attempt the following (Any Two) **16**

a) Describe the process of replication in eukaryotes
b) Explain the process of protein synthesis in prokaryotes.
c) Differentiate between prokaryotic and eukaryotic ribosomes add a note on ribosome assembly during protein synthesis.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - IX)
Algebra - II (19201524)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams whenever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) Which of the following is a set of units of the ring Z_8 is _____.
   a) {1,2,3,4} b) {2,3,5,6,7}
   c) {1,3,5,8} d) {1,3,5,7}

2) If $V = W_1 \oplus W_2$ then which of the following is incorrect?
   a) $V = W_1 + W_2$ b) $W_1 \cup W_2 = \{0\}$
   c) $W_1 \cap W_2 = \{0\}$ d) $W_1 \cap W_2 = \Phi$

3) Let $W = \{(a_1, a_2, a_3, a_4, a_5) \in \mathbb{R}^5 \backslash a_1 + a_3 + a_5 = 0, a_2 = a_4\}$ be a subspace, then dim(W)= _____.
   a) 1 b) 2
   c) 3 d) 4

4) Which of the following is not an integral domain?
   a) Z_5 b) $Z[\sqrt{2}]$
   c) $Z \oplus Z$ d) $Z[i]$

5) The number of ideal of the ring Z_{18} is _____.
   a) 6 b) 18
   c) 5 d) 2

6) In an inner product space V norm of V is _____.
   a) $< V, V >$ b) $< V, V >^2$
   c) $\sqrt{< V, V >}$ d) V

7) In ring Z which of the following is correct?
   a) It has finite no of maximal ideal
   b) square of prime number generate a maximal ideal
   c) every non zero prime ideal is maximal ideal
   d) there is no maximal ideal

8) The dimension of $P_n(F)$ is _____.
   a) n b) n^2
   c) $n + 1$ d) $n + 2$

9) The ring Z_{10} has _____.
   a) exactly two maximal ideal b) no maximal ideal
   c) exactly one maximal ideal d) at least 3 maximal ideal

10) Number of ideals of any field are _____.
   a) 1 b) 2
   c) Infinite d) 0

B) Fill in the blank/Definition/one sentence answer/ one word answer/give the name/ predict the product etc. **06**

1) Every element in a ring has an _____ inverse.
2) A field F is a _____ ring with non-zero unity such that the set of non-zero elements of F is a group under multiplication.
3) Every integral domain of characteristic zero is _____.
4) Define skew field with example.
5) Define Hom(v).
6) Define Inner product Space.

Q.2 Answer the followings (Any Eight): **16**

a) Define Basis of a vector Space.
b) If f is an isomorphism of a ring R onto a ring R' then prove that the image of the zero of R is the zero of R'.
c) Find all idempotent and nilpotent elements of ring Z_4.
d) Define Rank and Nullity of a linear transformation.
e) Find the characteristic of $Z_2 \times 2Z$ and $Z_2 \times Z_4$.
f) Prove that $\|cx\| = |c| \, \|x\|$
g) Show that in F^3\{(1,1,0),(1,-1,1),(-1,1,2)\} is an orthogonal set.
h) $T: R^3 \to R^2$ be linear transformation defined by $T(x, y, z) = (x - y, 2z)$find $N(T)$ and $R(T)$.
i) Find all prime and maximal ideals of Z_{12}.
j) Show that 2Z is not isomorphic to 3Z as rings.

Q.3 A) Answer the followings (Any Two): **10**

1) Prove that intersection of two ideals in R is an ideal of R whereas union is not an ideal.
2) Prove that the characteristic of an integral domain is either zero or a prime number.
3) Show that the vectors {(1,2,1), (2,1,0), (1,-1,2)} forms a basis of R^3.

B) Prove that every finite integral domain is field. **06**

Q.4 A) Answer the followings (Any Two): **08**

1) Let V and W be vector spaces, and let $T: V \to W$ is linear. Prove that T is one one if and only if $N(T) = \{0\}$.
2) Let T be an invertible linear transformation from V to W. Then V is finite dimensional if and only if W is finite- dimensional.
3) State and prove fundamental theorem of ring homomorphism.

B) State and prove Rank nullity theorem for finite dimensional vector space. **08**

Q.5 Answer the following (Any Two). **16**

a) Let V be a vector Space that is generated by a set G containing exactly n vectors, let L be a L.I. subset of V containing exactly m vectors. Prove that $m \leq n$ and $\exists$ a subset H of G containing exactly n-m vectors such that $L \cup H$ generates V.

b) Let R is commutative ring with unity prove that an ideal M of R is maximal ideal if and only if $\frac{R}{M}$ is field.

c) Find range, rank, Ker and nullity of the linear transformation $T: R^3 \to R^3$ s.t.

$$T(x, y, z) = (x + z, x + y + 2z, 2x + y + 3z)$$

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - IX)
Statistical Inference - I (19201528)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) If T is unbiased for θ then $\emptyset(T)$ is unbiased for $\emptyset(\theta)$ if $\emptyset$ is _____.
   a) Linear b) Continuous
   c) Onto d) One-to-one

2) Consistency of an estimator is a _____.
   a) Large sample property
   b) Small sample property
   c) Property not related to sample size
   d) property applicable to any sample size

3) Which of the following is an estimation procedure?
   a) Point estimation b) Interval estimation
   c) Both a) and b) d) None of these

4) If the expected value of an estimator is equal to its parametric function, it is said to be a _____.
   a) Unbiased estimator b) Biased estimator
   c) Consistent estimator d) None of the above

5) An estimator which converges to a parameter θ in probability as the sample size tends to infinity is said to be _____.
   a) Sufficient estimator b) Efficient estimator
   c) Consistent estimator d) Unbiased estimator

6) The estimator $\frac{\sum X_i}{n}$ of population mean is _____.
   a) An Unbiased estimator b) A consistent estimator
   c) Both a and b d) A biased estimator

7) An estimator is considered to be best if its distribution is:
   a) Continuous
   b) Discrete
   c) Concentrated about the true parameter value
   d) Normal

8) If T_1 and T_2 be two unbiased estimators of θ. The estimator T_2 is said to be more efficient than estimator T_1 if _____.
   a) $Var(T_1) = Var(T_2)$ b) $Var(T_1) < Var(T_2)$
   c) $Var(T_1) > Var(T_2)$ d) None of the above

9) Pitman-Koopman form of probability distribution is used to determine _____ estimator of the parameter.
   a) Unbiased b) Sufficient
   c) Efficient d) Consistent

10) Which one of the following is unique estimator?
   a) Unbiased b) Biased
   c) U.M.V.U.E. d) Sufficient

B) Fill in the blanks. **06**

1) Bias of an estimator can be _____.
2) Likelihood function is a function of _____.
3) Let 5, 8, 3, 6, 8 are observations from Poisson (λ) then unbiased estimate of λ is _____.
4) If $X_1, X_2, \dots X_n$ is a random sample from $U(0, \theta)$ then sufficient statistic for θ is _____.
5) Population characteristics is called _____.
6) If statistic T is unbiased estimator of parameter θ then unbiased estimator of $7\theta + 4$ is _____.

Q.2 Answer the followings (Any Eight): **16**

a) Define information function $\mathrm{I}(\theta)$ of parameter θ.
b) Define consistent estimator.
c) Show that sample mean is unbiased estimator of population mean.
d) Define likelihood function of a random variable $X_1, X_2, \dots X_n$ from exponential distribution with parameter θ
e) Explain relative efficiently.
f) Define Minimum Variance Unbiased Estimator (MVUE).
g) Define a sample and a population.
h) Define maximum likelihood estimator.
i) Define positive and negative bias.
j) Distinguish between an estimator and estimate.

Q.3 A) Attempt the following (Any Two) **10**

1) Let $X_1, X_2, \dots X_n$ be a random sample from $U(0, \theta)$then find sufficient statistic for θ.
2) If $X_1, X_2, \dots X_n$ is a random sample from Exponential distribution find MVBUE of θ.
3) Prove that if T is unbiased estimator of θ, then $\varphi(T)$ is an unbiased estimator of $\varphi(\theta)$ provided $\varphi(.)$ is a linear function

B) Explain the concept of sufficiency. Let $X_1, X_2, \ldots X_n$ be a random sample of size n from a distribution with pdf $f(x,\theta) = \theta X^{\theta-1}$; $0 < x < 1$ 0 ; Otherwise **06**

Obtain a sufficient statistic for θ.

Q.4 A) Attempt the following (Any Two) **08**

1) Obtain the MLE of the parameter θ based on a r.s. of size n from Poisson Distribution.
2) Let $X_1, X_2, \ldots, X_n$ be a random sample from $N(\mu, \sigma^2)$. Show that sample variance S^2 is a consistent estimator of σ^2.
3) Prove that a biased estimator is consistent if its bias and variance both tend to zero as the sample size tends to infinity.

B) Let X_1 , X_2 and X_3 is a r.s. from $P(\theta)$ distribution. **08**

Let $T_1 = \frac{X_1+X_2+X_3}{3}$ $T_2 = \frac{X_1+2\,X_2+X_3}{4}$

Show that T_1 and T_2 are unbiased estimator of θ and also find the efficiency of T_2 in relative to T_1

Q.5 Answer the following (Any Two). **16**

a) If X has $N(\mu, \sigma^2)$ find the Fisher information function.
1) $\mathrm{I}(\mu)$ when σ^2 is known
2) $\mathrm{I}(\sigma)^2$ when μ is known

b) State and prove Crammer Rao Inequality.

c) Define Uniformly Minimum Variance Unbiased Estimator (UMVUE) and show that it is unique when it exists.

SLR-DA-177

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper - IX)
Economic Geology (19201534)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators in allowed.

Q.1 A) Multiple choice questions. **10**

1) The ore deposits formed by the direct contact of magma and chemically active fluid with country rock are _____ deposits.
   a) Hydrothermal b) Contact metasomatic
   c) Magmatic concentration d) None of these

2) Sulphide ores are the most common products of _____ process.
   a) Fluvial b) Residual
   c) Magmatic d) Supergene enrichment

3) Ingaldhal copper deposits in Karnataka belongs to _____ formation.
   a) Chitradurg b) Peninsular gneissic complex
   c) Bababudhan d) Sargur group

4) The placer deposits along the coastal tract of Maharashtra is _____.
   a) Gold b) Zircon
   c) Rutile d) Ilmenite

5) The surficial indicator of the hidden ore deposit is _____.
   a) host rock b) gossan
   c) ore mineral d) gauge mineral

6) 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

7) The minerals from which one or more metals can be extracted economically are called as _____ minerals.
   a) ore b) industrial
   c) secondary d) important

8) Iron is commonly precipitated as: _____.
   a) Siderite b) Limonite
   c) Hematite d) All the above

9) Residual liquid segregation deposits are _____ deposits.
   a) Exogenetic
   b) Metasomatic
   c) Late magmatic concentration
   d) Residual

10) Uranium deposits of Jaduguda is example of _____ process.
a) Dissemination b) Segregation
c) Residual liquid injection d) None

B) Fill in the blanks: **06**

1) The process responsible for the formation of placer deposits is _____ concentration.
2) Hydrothermal mineralisation along the crests of anticlines is _____.
3) _____ is the ore deposit which has formed after the formation of host rock in which they occur.
4) Greenstone belts of Precambrian terrain are good for searching ____.
5) _____ are mineral deposits formed by the evaporation of water in marine origin but terrestrially formed deposits are also of economic importance.
6) The placer deposits formed by the action of ocean waves are called _____ placers.

Q.2 Answer any Eight of the following. **16**

1) Name the types of mechanical concentration.
2) Give any two essential conditions for the formation of hydrothermal deposits.
3) What are metalliferous mineral deposits?
4) Give two examples of copper ore deposits.
5) Write the conditions essential for the formation of Residual ore deposits.
6) Name the ore minerals formed by sublimation process.
7) Define Gossan.
8) Name the zones of supergene sulphide enrichment.
9) Name the types of magmatic deposits.
10) Define Skarn.

Q.3 A) Attempt any Two of the following: **10**

1) Explain metasomatic deposits with suitable example.
2) Describe the early magmatic ore deposits with suitable example.
3) Discuss copper ore deposits of India.

B) Write short note on Sublimation with examples. **06**

Q.4 A) Attempt any Two of the following: **08**

1) Explain the formation of Laterite.
2) Discuss the condition essential for formation of Placer deposits.
3) Write a note on fissure vein deposits with suitable diagram.

B) Describe in brief the hydrothermal cavity filling deposits with suitable examples. **08**

Q.5 Attempt any Two of the following: **16**

a) Describe in brief Supergene sulphide deposits with suitable diagram.
b) Discuss the formation of coal and its classification. Add note on occurrence of coal deposits in India.
c) Define Skarn. Explain the metamorphic deposits with suitable example.

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Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - IX)
Virology (19201539)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams whenever necessary.
3) Figures to right indicate full marks.
4) Use of log tables and calculators are allowed.

Q.1 A) Multiple Choice Questions. **10**

1) _____ virus among the following possesses complex symmetry.
a) λ b) P1
c) T4 d) Adenovirus

2) Migration of cancerous cell from the site of origin to the other parts of the body is called as _____.
a) Tumor b) Metastasis
c) Necrosis d) Apoptosis

3) _____ is a DNA oncogenic virus.
a) Epstein Bar virus b) Rous sarcoma virus
c) Lukemia Virus d) Influenza virus

4) The bacteriophage capable of establishing lysogenic relationship with their host cells are called _____ phages.
a) Lytic b) Temperate
c) Prions d) Virions

5) All RNA viruses are placed in _____ type of family of viral classification.
a) Riboviridae b) Deoxyviridae
c) Phycoviridae d) Viroviridae

6) The genetic material of influenza virus is _____.
a) SS RNA b) DS SS RNA
c) SS DNA d) DS DNA

7) The time from initiation of infected cell lysis upto rise of count of new virus particle is known as _____.
a) Latent period b) Burst period
c) Eclipse period d) Burst size

8) Bacteriophages are readily counted by the process of _____.
a) Tissue culture b) Plaque assay
c) ELISA d) Acid titration

9) _____ is a cancer that originated in epithelial cells.
a) Lymphoma b) Leukemia
c) Sarcoma d) Carcinoma

10) An icosahedral capsid consists of _____ capsomers.
a) Hexagonal b) Pentagonal
c) Triangular d) Both a & b

B) Define the following **06**

1) Define envelop
2) Define Virion
3) Prions
4) Eclipse period
5) Defective immunity
6) Enlist two DNA virus

Q.2 Solve any Eight of the following. **16**

a) What are the different types of viral capsid symmetry?
b) Enlist properties of tumor cell.
c) What is temperate phage?
d) What is role of N and cro protein?
e) What is virioid?
f) What is somatic mutation?
g) Symptoms of plant viral diseases.
h) Enlist two enveloped viruses.
i) What is capsid?
j) What is oncogenic virus?

Q.3 A) Attempt any Two of the following. **10**

1) Explain in brief lysogeny of λ phage.
2) Describe in detail replication of Adenovirus and add a note on its transmission and symptoms of disease.
3) Describe in brief prevention and control of plant viral disease.

B) Discuss in detail the one step growth experiment. **06**

Q.4 A) Attempt any two of the following. **08**

1) Give a detailed account on TMV virus.
2) Give a brief account on common characteristics of virus.
3) Discuss in brief structure and replication of influenza virus.

B) Give a detailed account on isolation, cultivation and enumeration of viruses. **08**

Q.5 Attempt any two of the following. **16**

a) Give a detail account on classification of viruses.
b) Describe in detail lytic cycle of T_4 bacteriophage.
c) What is cancer? Discuss in detail types of cancer.

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Seat No.	

Set P

B.Sc.(Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Special Paper - IX)
Linear Integrated Circuits and Applications (19201548)

Day & Date: Sunday, 03-12-2023 Max. Marks: 80
Time: 03:00 PM To 6:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Chose correct alternative and rewrite the sentence. **10**

1) The component which is not possible to fabricate in IC is _____.
a) Resistor b) Inductor
c) Diode d) Capacitor

2) An integrated circuit offers _____.
a) Low power consumption b) Improved performance
c) High speed d) All of the above

3) The all-pass filter has _____.
a) No pass band
b) No stop band
c) The same gain at all frequencies
d) None of these

4) In basic log amplifier, the transistor is used as _____.
a) The feedback element b) Series element with input
c) Active load at the output d) None of these

5) To rectify voltage less than 0.6 V _____ is used.
a) Tunnel diode b) Precision diode
c) LED d) None of these

6) The range of frequency over with the PLL can acquire lock with an input signal is called the _____.
a) Lock range b) Capturer range
c) Transfer range d) None of these

7) The relation between Lock-Range (LR) and Capture-Range (CR) is ____.
a) LR = CR b) LR < CR
c) LR > CR d) All of these

8) A chip having more than 3000 logic gate is known as _____.
a) SSI chip b) MSI chip
c) LSI chip d) VLSI chip

9) Which of the following is F to V converter?
a) LM 331 b) LM 317
c) LM 301 d) LM 308

10) For proper operation of voltage regulator, input voltage _____ must be output voltage.

a) Less than b) Greater than
c) Equal to d) None of these

B) Fill in the blank. **06**

1) Which IC _____ is a phase locked loop.
2) In second order low pass filter the number of RC combination is _____.
3) IC 7805 is a _____ voltage regulator.
4) Which filter _____ is also known as notch filter.
5) In epitaxial process _____ is used as silicon source.
6) Which IC _____ is regulated power supply for -5 volt?

Q.2 Solve the following (Any Eight) **16**

a) Give the different methods of fabricating resistor in IC.
b) What are the advantages of IC voltage regulator?
c) Define lock range and capture range in PLL.
d) List the basic building blocks of PLL.
e) What is the purpose of having input and output capacitors in three terminal IC regulators?
f) In second order low pass filter R1 = R2 = 1 K and C1 = C2 = 0.1. Calculate cut off frequency.
g) What do you mean by passive and active filters?
h) Draw block diagram of IC regulator.
i) In regulated power supply calculate the value of Rac for a load current of 500 mA. Given Vsense = 0.5 Volt.
j) Draw the circuit diagram of log amplifier.

Q.3 A) Attempt the following (Any Two) **10**

1) Draw and explain the functional block diagram of the LM-31.
2) Explain briefly the fabrication of capacitor in IC.
3) What is full wave precision rectifier? Explain in brief.

B) Short note active peak detector. **06**

Q.4 A) Attempt the following (Any Two) **08**

1) Draw the pin configuration of IC LM 317 and state the expression for its output voltage.
2) Explain sample and hold circuit.
3) Explain second order high pass filter.

B) Explain log and Antilog amplifier using op-Amp. **08**

Q.5 Attempt the following (Any Two) **16**

a) Explain principle and working of PLL.
b) Explain clipper and clamper by using op-amp.
c) What is epitaxial process? Explain epitaxial process used in IC fabrication.

SLR-DA-180

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Special Paper - IX)
Visual Programming Using C# (19201543)

Day & Date: Sunday, 03-12-2023 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) Multiple choice questions. **10**

1) The data members of a class by default are?
a) protected, public b) private, public
c) private d) public

2) Abstract class contains _____.
a) Abstract method b) Non abstract method
c) Both a and b d) None of these

3) What is CLR in C#?
a) It is a virtual machine component of Microsoft .NET Framework
b) It is a virtual machine component of JV
c) It is a compiler to compiler the C# code
d) All of the above

4) Which of the access specifier is used in interface in C#?
a) Private b) Public
c) Protected d) All of the above

5) How many catch blocks can be used with a single try block in C#?
a) One b) Two
c) Many d) None of the above

6) C# does not support _____.
a) abstraction b) polymorphism
c) multiple inheritance d) inheritance

7) By default Priority of thread is _____.
a) Normal b) Highest
c) above normal d) below normal

8) To implement delegates, the necessary condition is?
a) class declaration b) inheritance
c) runtime polymorphism d) exceptions

9) Which of the given stream methods provide access to the output console by default in C#.NET?
a) Console.In b) Console.Out
c) Console.Error d) All of the mentioned

10) The _____ are the graphical user interface (GUI) components created for User interaction.
a) Web Form b) Window Form
c) Application Form d) None of these

B) Fill in the blanks. **06**

1) Virtual method defined in _____ class is inherited by it's derived class.
2) _____ allows us to develop an application without having worry to free memory.
3) Shared assembly placing in special directory substring in file in known as _____.
4) _____ method can not be override.
5) _____ method is called to suspend the thread.
6) An anonymous method is one way to create an _____ block of code.

Q.2 Solve the following (Any Eight) **16**

a) What is threading?
b) What is boxing & unboxing?
c) What is OUT parameter?
d) What is managed code?
e) What is function overriding?
f) Define Polymorphism.
g) Define delegate.
h) Define CTS.
i) What is Assembly?
j) What is Exception handling?

Q.3 A) Attempt the following (Any Two) **10**

1) Write a program for derived interface.
2) Explain Thread Priorities.
3) Write a program for file which can write data into file and read data from file.

B) Write short note on Common Language Runtime. **06**

Q.4 A) Attempt the following (Any Two) **08**

1) What are the types of delegate? Describe the steps to create and implement delegate.
2) Write a program for custom exception.
3) Explain Thread Life Cycle.

B) What are the types polymorphism? Write a program for operator overloading. **08**

Q.5 Attempt the following (Any Two) **16**

a) What is sealed class and sealed method? Write a program for sealed class and sealed method?
b) What is File Stream? Explain Stream Reader and Stream Writer with example.
c) What is multithreading? Write a program which implement multiple threads with single application.

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Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Special Paper - X)
Solid State Physics (19201512)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) Packing density of HCP structure is _____.
   a) 1 b) 0.52
   c) 0.68 d) 0.74

2) The relation between lattice parameters in square lattice is _____.
   a) $a \neq b, \emptyset = 90°$ b) $a = b, \emptyset = 90°$
   c) $a = b, \emptyset = 120°$ d) $a \neq b, \emptyset = 1200$

3) Bragg's law in terms of reciprocal lattice vector is _____.
   a) $2\mathrm{K}.\mathrm{G} + \mathrm{K}^2 = 0$ b) $\mathrm{G}.\mathrm{G} + 2\mathrm{K}.2\mathrm{K} = 0$
   c) $2\mathrm{K}.\mathrm{G} + \mathrm{G}^2 = 0$ d) $2\mathrm{G}.\mathrm{G} + \mathrm{K}.\mathrm{K} = 0$

4) A is direct lattice and a* is reciprocal lattice then _____.
   a) $a.a^* = 0$ b) $\frac{1}{a}.a^* = 0$
   c) $\frac{1}{a^*}.a = 0$ d) $a.\ a^* = 1$

5) If T>0 and E=E_F then, fermi energy F(E)= _____%.
   a) 40 b) 50
   c) 60 d) 70

6) Electrical conductivity of the metal is _____.
   a) independent on electron density
   b) dependent on electron density
   c) independent on proton density
   d) None of these

7) Hall coefficient is _____ for electron.
   a) positive b) negative
   c) positive and negative d) zero

8) Spontaneous magnetization is the most important characteristics of _____ material.
   a) paramagnetic b) diamagnetic
   c) ferromagnetic d) ferrimagnetic

9) Ferrite is a class of _____ material.
   a) paramagnetic b) diamagnetic
   c) ferromagnetic d) ferrimagnetic

10) Meissner effect is _____ property of superconductor.
a) bulk b) insulating
c) surface d) conducting

B) Fill in the blank/ Definition/ One sentence answer/ One word answer/ Give the (06) name/Predict the product etc. **06**

1) Bragg's law of X ray diffraction is _____.
2) What is ferrimagnetic material?
3) The ratio of electrical to thermal conductivity of all metals is inversely proportional to _____.
4) What is range of forbidden energy E_G in semiconductors?
5) Write the classification of Bravais lattice in two dimensions.
6) Superconductor exhibits a perfect _____.

Q.2 Solve any Eight of the following. **16**

a) Define the term packing fraction.
b) Write any two properties of ferrimagnetic material.
c) What are the uses of Hall effect?
d) Define the term reciprocal lattice.
e) What is superconductor?
f) State any two properties of reciprocal lattice.
g) What are the types of crystal structure?
h) What is hard superconductor?
i) What is Hall effect?
j) Write the classification of Bravais lattice in three dimensions.

Q.3 A) Attempt any Two of the following. **10**

1) State and explain Meissner effect.
2) Calculate the lattice spacing between (111) planes in an orthorhombic lattice, where a=2.4A^0, b=3.1 A^0 and c=1 .9 A^0.
3) Explain graphical construction of reciprocal lattice one dimensional lattice.

B) Short note/Solve. **06**

Energy loss in the hysteresis.

Q.4 A) Attempt any Two of the following. **08**

1) Find out the Miller indices of the planes (3a,6b,2c) and (2a,4b, c/2).
2) Show that the reciprocal of the reciprocal lattice is the direct lattice.
3) Explain the distinction between metals, semiconductors and insulators using band theory.

B) Describe/Explain/Solve. **08**

Explain powder method of X-ray diffraction.

Q.5 Attempt any Two of the following. **16**

a) Show that the packing density for BCC structure is 0.68.
b) Explain fermi-Dirac distribution of electron in metal.
c) Derive an expression for effective mass of an electron in two-dimensional lattice.

SLR-DA-182

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Special Paper - X)
Inorganic Chemistry (19201507)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat and 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 the correct alternative for the following. **10**

1) CFSE for d^3 octahedral complex is _____ Dq.
a) -6 b) -12
c) 8 d) -18

2) In 1935 Molecular orbital theory was developed by _____.
a) H. Bethe b) L. Pauling
c) J. Van Vleck d) Jahn Teller

3) For age determination by tracer technique _____ isotope is used.
a) ^{17}O b) ^{36}Cl
c) ^{12}C d) ^{14}C

4) The principle of atom bomb is _____.
a) nuclear fusion
b) controlled chain reaction
c) uncontrolled chain reaction
d) natural radioactivity

5) Myoglobin contains _____ heme unit.
a) 1 b) 4
c) 2 d) 3

6) Function of haemoglobin is transport of _____ from lungs to muscles.
a) O_2 b) CO_2
c) CO d) N_2

7) In the manufacture of ammonia _____ Catalyst is used.
a) Al_2O_3 b) Zn-Cu
c) Pt d) Fe + Mo

8) A catalytic reaction caused by acid are called as _____ catalysis.
a) acid b) alcohol
c) base d) aqueous

9) Ammonium sulphate contains _____ % of N.
a) 45 b) 60
c) 20 d) 80

10) The fertilizer contains primary nutrients N, P, K are called as _____ fertilizer.
a) Incomplete b) Complete
c) Nitrogenous d) Micro

B) Fill in the blanks. **06**

1) According to CFT bonding between metal and ligand is _____.
2) In boiling water nuclear reactor _____ is used as a control rod.
3) $^{14}N_7 + {}^{4}He_2$ _____ $^{17}O_8 +$ _____.
4) Porphyrin ring has _____ nitrogen atom in one plane.
5) In the conversion of glucose to ethanol the enzyme catalyst used is ____.
6) The fertilizers required in small quantity is called as _____.

Q.2 Solve any eight of the following. **16**

a) Give the applications of CFT.
b) What are the limitations of MOT?
c) Define the term nuclear reaction.
d) Give the classification of nuclear reaction.
e) What is projectile capture reaction?
f) Give the function of sodium in biological process.
g) Give the advantages of mixed fertilizers.
h) Give the two examples of heterogeneous catalysis.
i) Explain the qualities of ideal fertilizers.
j) Mention the types of fertilizers.

Q.3 A) Attempt any two of the following. **10**

1) Describe the crystal field splitting for tetrahedral complex with suitable example.
2) Distinguish between haemoglobin and myoglobin.
3) Explain the positive catalysis and negative catalysis.

B) Describe the Nuclear fusion reaction. **06**

Q.4 A) Attempt any two of the following. **08**

1) Give the crystal field splitting of $[Co(NH_3)_6]^{3+}$ complex.
2) Explain the manufacture process of ammonium sulphate from gypsum.
3) Give the assumptions of Molecular orbital theory.

B) What is catalyst? Describe the intermediate compound theory of catalysis **08**

Q.5 Attempt any two of the following. **16**

a) With the help of MO diagram explain the formation of $[Ni(NH_3)_6]^{2+}$ complex. Comment on its magnetic properties.
b) What is metalloporphyrins? Explain the structure and working of Haemoglobin.
c) What are radioactive tracers? Explain in brief structural determination of PCl_5

SLR-DA-183

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper- X)
Genetics (19201502)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary
3) Figures to right indicate full marks.
4) Use of logarithmic table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) The term genetics first time used by Bateson in _____.
a) 1906 b) 1907
c) 1908 d) 1909

2) Cross involving more than two pairs of contrasting characters is known as _____ hybrid.
a) mono b) poly
c) di d) all of these

3) There are two type of _____ linkage.
a) complete b) incomplete
c) both a and b d) none of these

4) Dominant alleles tend to remain together is known as _____.
a) repulson b) coupling
c) both a and b d) none of these.

5) In humans there are 23 pairs of chromosomes _____ pairs and one pair of sex chromosomes.
a) 23 autosomal b) 21 autosomal
c) 22 autosomal d) 24 autosomal

6) Hairy pinna reported by Droramraju in _____.
a) 1957 b) 1958
c) 1959 d) 1960

7) E.M. East in _____ used two varieties of *Nicotiana longiflora,* which differed in corolla length.
a) 1916 b) 1917
c) 1918 d) 1919

8) In _____ two man made a very important construction to the study of population genetics.
a) 1907 b) 1908
c) 1909 d) 1910

9) Cytoplasmic inheritance this was first described by _____ in 1908.
a) Mark Correns b) David Correns
c) John Correns d) Carl Correns

10) The extrachromosomal genes are present in the _____.
a) plastid b) mitochondria
c) both a and b d) none of these

B) Give the one sentence answer of the following. **06**

1) Who is the father of genetics.
2) What is gene?
3) Write the phenotypic ratio of complementary genes.
4) Give the type of linkage.
5) Write the one example of sex linked inheritance.
6) Give the one example of extra chromosomal Inheritance.

Q.2 Solve any eight of the following. **16**

a) What is test cross.
b) Define trihybrid ratio.
c) What is linkage?
d) Give the definition of repulson.
e) Define sex chromosomes.
f) What is mean by holandric genes?
g) Define population genetics.
h) Explain the continuous variation.
i) What is cytoplasmic inheritance?
j) Define heterozygous.

Q.3 A) Attempt any two of the following. **10**

1) Explain the maternal effect of inheritance.
2) Describe the plastid inheritance studied by you.
3) Write the mitochondrial genome.

B) Write short notes any two of the following. **06**

1) Polygene theory.
2) Significance of crossing over.
3) Monohybrid ratio.

Q.4 A) Attempt any two of the following. **08**

1) Explain the law of dominance.
2) Describe the supplementary gene studied by you.
3) Explain the incomplete linkage.

B) Attempt any one of the following. **08**

1) Describe the cytological proof of crossing over.
2) Explain the colourblindness studied by you.

Q.5 Attempt any two of the following. **16**

a) Give the sex chromosome in drosophila.
b) Describe the Hardy-Weinberg law studied by you.
c) Explain the inheritance of chloroplast genes with suitable example.

SLR-DA-184

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Special Paper - X)
Principles of Genetics (19201521)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams whenever necessary.
3) Figures to right indicate full marks.

Q.1 A) Multiple Choice Question. **10**

1) Who is regarded as the father of genetics?
   a) Bateson b) Morgan
   c) Mendel d) Watson

2) Crossing over occurs between _____.
   a) Sister chromatid b) Non Sister chromatid
   c) Both a and b d) None of these

3) The term linkage was coined by _____.
   a) T. Boveri b) G. Mendel
   c) T. Morgan d) W. Sultan

4) Point mutation involves _____.
   a) Deletion b) Insertion
   c) Duplication d) Change in single base pair

5) In human the mechanism of sex determination is _____.
   a) XX-XX0 type b) XX-X type
   c) XX-XY type d) XX-XX type

6) Extra chromosomal inheritance involves genes passed on by the mothers _____.
   a) Smooth ER b) Mitochondria
   c) Golgi body d) Rough ER

7) Traits which exhibits continuous phenotypic variation are typically determined by which inheritance forma _____.
   a) Incomplete dominance b) Polygenic inheritance
   c) Multiple allies inheritance d) Sex linked inheritance

8) The transfer of genes from one cell to another by a bacteriophage is known as _____.
   a) Transduction b) Recombination
   c) Conjugation d) Transformation

9) What are known as safe havens during insertion of transposable elements?
   a) Centromere regions b) Rertotransposons region
   c) Hetero chromatin regions d) All of these

10) Death causing genes are called as _____.
a) Lethal gene b) Dominant gene
c) Recessive gene d) Heterozygous gene

B) Fill in the blanks. **06**

1) Phenotypic ratio of monohybrid cross is _____.
2) Phenotypic ratio of dihybrid cross _____.
3) Complementary gene interaction ratio _____.
4) Supplementary gene interaction ratio _____.
5) Inhibitory gene interaction ratio _____.
6) Incomplete dominance ratio _____.

Q.2 Solve any Eight of the following. **16**

1) Define linkage and crossing over.
2) Low of dominance.
3) Chromosomal aberrations-deletion.
4) Turner syndrome.
5) Sex limited characters.
6) Duplication-chromosomal aberrations.
7) Klinfelters syndrome.
8) Down syndrome.
9) Co-dominance.
10) Gene interaction.

Q.3 A) Attempt any two of the fallowing. **10**

1) Describe law of segregation.
2) Explain cytological proof of crossing over.
3) Define multiple alleles? Explain it with suitable example.

B) Short Notes. **06**

Law of independent assortment.

Q.4 A) Attempt any two of the following. **08**

1) Describe complementary gene interaction.
2) Explain the types of linkage with suitable examples.
3) Transformation as recombination in bacteria.

B) Describe/Explain solve. **08**

Describe supplementary gene interaction.

Q.5 Attempt any two of the following. **16**

a) Describe polygenic inheritance with suitable example.
b) Explain extarchra chromosomal inheritance with suitable example.
c) Describe inhibitory gene interaction.

SLR-DA-185

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - X)
Complex Analysis (19201525)

Day & Date: Monday, 04-12-2023 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) Choose correct alternative for each of the following. **10**

1) The residue of $\frac{z^3}{(z-1)^4(z-2)(z-3)}$ at $z = 2,3$ is _____.

a) $-8, \frac{27}{16}$ b) $8, -\frac{27}{16}$
c) $-8, -\frac{27}{16}$ d) $8, \frac{27}{16}$

2) To evaluate the integral of the type $\int_0^{2\pi} f(\cos\theta, \sin\theta)d\theta$ the contour used is _____.

a) Semi circle b) Unit circle
c) Rectangle d) Any circle

3) Residue of $\frac{1}{\sin z - \cos z}$ at $z = \frac{\pi}{4}$ is _____.

a) 0 b) ∞
c) $\frac{1}{\sqrt{2}}$ d) $\frac{1}{2}$

4) Function satisfying Laplace's equation are known as _____.

a) Regular b) Conjugate
c) Homomorphic d) Harmonic

5) Value of $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)$ =_____.

a) $2\frac{\partial^2}{\partial Z \cdot \partial \bar{Z}}$ b) $-2\frac{\partial^2}{\partial Z \cdot \partial \bar{Z}}$
c) $4\frac{\partial^2}{\partial Z \cdot \partial \bar{Z}}$ d) $-4\frac{\partial^2}{\partial Z \cdot \partial \bar{Z}}$

6) Harmonic conjugate of the function $e^x \cdot \cos y$ is _____.

a) $e^{-x}\sin y + c$ b) $e^x \sin y + c$
c) $e^{-x}\cos y$ d) $e^x \cos y$

7) If $w = u + iv$ be analytic function $z = x + iy$, the families of curves $u(x, y) = \alpha, v(x, y) = \beta$ form _____.

a) Orthogonal system b) Harmonic system
c) Conjugate system d) Analytic system

8) If c is given by the equation $|z-a|=R$, then the value of $\int_c \frac{dz}{z-a}$ is _____.

a) $2\pi i$ b) $-2\pi i$
c) $-\pi i$ d) πi

9) Which of the following is true?

a) $\left|\int_L f(z)dz\right| \leq \int_L |f(z)|dz$ b) $\left|\int_L f(z)dz\right| \geq \int_L |f(z)||dz|$

c) $\left|\int_L f(z)dz\right| \leq \int_L |f(z)||dz|$ d) $\left|\int_L f(z)dz\right| \leq \int_L f(z)|dz|$

10) If $\int_L |dz|$ where L is any rectifiable are joining the point $z=a$ and $z=b$ is equal to _____.

a) $|b-a|$ b) arc length of L
c) $b-a$ d) 0

B) Fill in the blanks of the following. **06**

1) If $z=a$, $\lim_{\Delta z \to o} \frac{\Delta w}{\Delta z}$ depends on amp(Δz); then $f(z)$ is _____.
2) The polar form of complex number $-5+5i$ is _____.
3) Consider the function $f(z)=\frac{\sin z}{z}, z \in c$ then $f(z)$ has _____ singularity at $z=$ _____.
4) The value of $\int_c \frac{dz}{z}$, where c is the circle with center at origin and radius r.
5) If $\lim_{z\to a}(z-a)f(z)=A$ and if c is the arc $\theta_1 \leq \theta \leq \theta_2$ of the circle $|z-a|=r$ then $\lim_{r\to o}\int_c f(z)dz =$ _____.
6) A point at which a function $f(z)$ ceases to be analytic is called _____.

Q.2 Attempt any Eight of the following. **16**

a) Find the residue of $\frac{1}{(z^2+1)^3}$ at $z=i$
b) Find the residue of $\operatorname{cosec} z$ at $z=0$
c) Evaluate the residue of $f(z)=\frac{e^z}{z^2(z^2+9)}$ at $z=0$
d) Evaluate $\int_c \frac{dz}{(z-1)(z+1)}$ where c is circle $|z|=3$
e) Define Partition.
f) Evaluate $\int_L dz$ where L for $z=\alpha$ to $z=\beta$
g) Expand $f(z)=\frac{1}{2(z+1)}-\frac{1}{2(z+3)}$ valid for $|z|>3$
h) Construct the analytic function, $u=y^3-3x^2y$
i) Prove that, if $u=e^{-x}(x\sin y - y\cos y)$ is harmonic.
j) Find analytic function $u=\cos x \cdot \cosh y$ in term's of z.

Q.3 A) Attempt any two of the following. **10**

1) If $u - v = (x - y)(x^2 + 4xy + y^2)$ and $f(z) = u + iv$ is analytic function of $z = x + iy$. find $f(z)$ in terms z.

2) Show that $\int_0^{2\pi} \frac{d\theta}{a + b\cos\theta} = \frac{2\pi}{\sqrt{a^2 - b^2}}$, $a > b > 0$

3) Evaluate $\int_L \bar{z}dz$, where L line from $z = 0$ to $z = 2i$ also line from $z = 2i$ to $z = 4 + 2i$

B) State and prove Cauchy's Fundamental theorem. **06**

Q.4 A) Attempt any two of the following. **08**

1) Show that an analytic function with constant modulus in a domain is constant.

2) Prove that. $\int_o^{2\pi} e^{-\cos\theta}\cos(n\theta + \sin\theta)\,d\theta = (-1)^n\frac{2\pi}{n!}$

3) Expand $f(z) = \frac{(z-2)(z+2)}{(z+1)(z+4)}$, when $|<|z| < 4$

B) If the real part of the analytic function $f(z)$ is a given harmonic function $u(x, y)$ then prove that $f(z) = 2u\left(\frac{z}{2}, \frac{z}{2i}\right) - u(0,0)$ **08**

Q.5 Attempt any two of the following. **16**

a) Find the Cauchy-Riemann equations in polar form.

b) State and prove Cauchy's Residue theorem.

c) Prove that the function $\sin(c(z + \frac{1}{z}))$ can be expanded in the series of type $\sum_{n=o}^{\infty} a_n z^n + \sum_{n=1}^{\infty} bn\, z^{-n}$ in which the coefficient of both z^n and z^{-n} are $\frac{1}{2\pi}\int_0^{2\pi} \sin(2c\cos\theta)\cos n\theta d\theta$

SLR-DA-186

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - X)
Probability Distributions (19201529)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative of the following. **10**

1) If $X \sim$ Laplace $(0,1)$ then $V(X) =$ _____.
   a) 1 b) 0.5
   c) 0 *d)* 2

2) Probability curve of Laplace distributions is _____.
   a) Symmetric b) Positively skewed
   c) Bimodal d) Negatively skewed

3) If X is Lognormal $(0,1)$ then $E(X) =$ _____.
   a) e^2 b) 0
   c) 1 d) $e^{\frac{1}{2}}$

4) If X is Cauchy (10,20) then median is _____.
   a) 10 b) 20
   c) 30 d) -10

5) For Cauchy distribution _____ exists.
   a) median b) mean
   c) variance d) None of these

6) The range of a r.v. X following normal distribution truncated below 0 is _____.
   a) $-\infty$ to ∞ b) 0 to ∞
   c) $-\infty$ to 0 d) $-k$ to k

7) Let (X,Y) is BN (3,2,4,9,0.5) then cov(X,Y) is _____.
   a) 0 b) 1
   c) 2 d) 3

8) Mean of truncated binomial distribution truncated at $X = 0$ is _____.
   a) np b) $\frac{np}{q}$
   c) $\frac{np}{q^n}$ d) $\frac{np}{1-q^n}$

9) If $X \sim$ C (3,5) then quartile deviation is _____.
   a) 3 b) 5
   c) 6 d) 10

10) For obtaining p.m.f. of a truncated r.v. we have to use concept of _____.
   a) unconditional probability
   b) conditional probability
   c) lack of memory property
   d) area property

B) Attempt all of the following. **06**

1) Define Laplace distribution.
2) State p.m.f. of Weibull distribution.
3) What are the parameters of lognormal distribution?
4) State p.m.f. of truncated binomial distribution.
5) If $X \sim C$ (0,1) then what is distribution of X^2?
6) State relation on between mean, median and mode of Laplace distribution.

Q.2 Answer any eight of the following. **16**

a) State p.d.f. of Bivariate normal distribution.
b) Define Logistic distribution.
c) Define Pareto distribution.
d) State p.d.f. of truncated normal distribution truncated left below a.
e) Draw probability curve of Laplace distribution.
f) Show that Poisson distribution as particular case of Power series distribution.
g) Define Lognormal distribution with parameters (μ, σ^2).
h) Show that for $L(\mu, \lambda)$ all odd ordered central moments vanish.
i) If X is Cauchy (μ, λ) write expressions for Q_1 and Q_3.
j) State relation between Cauchy and uniform distribution.

Q.3 a) Attempt any two of the following. **10**

1) Obtain pdf of exponential distribution truncated below 'a' and find its mean.
2) Obtain mode of lognormal distribution.
3) If $X \sim C$ (0,1) then find the distribution of $\frac{1}{X}$

b) If $(X, Y) \sim BN\ (\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$ then prove that they are independent iff they are uncorrelated. **06**

Q.4 a) Answer any two of the following. **08**

1) Obtain p.m.f. of truncated binomial distribution truncated at $X = 0$ and obtain its mean.
2) If $X \sim LN\ (\mu\sigma^2)$ the find the distribution on of KX.
3) Let $(X, Y) \sim BN\ (\mu_1, \mu_2, \sigma_1^2, \sigma_2^2, \rho)$ then find the marginal distribution on of X.

b) Obtain cdf of Laplace (μ, λ) and obtain its quartiles. **08**

Q.5 Attempt any two of the following. **16**

a) Find mean and variance of Laplace distribution.
b) Let $X \sim LN\ (\mu, \sigma^2)$ the find the distribution of $Y = \frac{1}{X}$ and identify the distribution.
c) Obtain mean of truncated Poisson distribution truncated at $X = 0$

SLR-DA-187

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper - X)
Hydrogeology (19201535)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat diagrams wherever necessary.

Q.1 A) Rewrite the sentence by filling the blanks with the correct answer from the given options. **10**

1) What is the type of the springs emerging in basin like areas?
a) Contact b) Gravity
c) Hot d) Depression

2) What type of hydrogeological character is that if the rock or formation stores and transmits a significant amount of water?
a) aquitards b) aquiclude
c) aquifer d) None of these

3) What does the 'root zone' of groundwater refer to _____?
a) saturated zone
b) uppermost part of unsaturated zone
c) zone in which water is drawn upward from the water table by capillary action
d) None of these

4) Which of the following deposits will probably provide the poor ground-water supply?
a) high altitude shale terrain b) till
c) alluvium d) lake clay

5) What type of aquifer, whose groundwater is in direct vertical contact with the atmosphere through open pores?
a) confined b) unconfined
c) perched d) artesian

6) What better defines 'the capacity of a rock to transmit water through its pores'?
a) porosity b) void ratio
c) permeability d) flow

7) Which of the following usually has the highest porosity?
a) gravel b) sand
c) clay d) boulder

8) What composes the study of the water cycle? d)
a) Remote sensing b) Petrology
c) Hydrogeology d) surface runoff

9) What does the porosity of a rock promotes?
a) infiltration b) transpiration
c) precipitation d) runoff

10) What part of the plant is involved in transpiration that adds water in the water cycle?

a) runners b) stem
c) leaves d) root

B) Answer the following. **06**

1) What does Specific yield term in hydrogeology mean?
2) What does secondary porosity term in hydrogeology mean?
3) What does retention capacity term in hydrogeology mean?
4) What does piezometric surface term in hydrogeology mean?
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? Add note on its controlling factors.
b) What is hydrogeology? Why is it important to study?
c) What is a perched aquifer? What are its limitations?
d) What is a perched water table? Explain its lateral limits.
e) What is Transmissivity? Add note on role of temperature in its functioning.
f) What is an aquifer? Just write a list of its different types.
g) What is an overflowing well? Why it overflows?
h) What is a recharge zone? Where is it in Basaltic terrain?
i) What is the water cycle? How does temperature play an important role in it?
j) What is a basin divide? Which is the nearest basin divide in your area?

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 wrt 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 folded structures for its significance of groundwater. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain how the rock textures function, wrt to groundwater?
b) Define watershed. Explain its elements. Draw figures of watershed.
c) What is artesian well? Explain the confined aquifer Draw its diagram.

SLR-DA-188

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - X)
Agricultural Microbiology (19201540)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagram wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Rewrite the sentences by selecting correct alternative. **10**

1) Availability of water and mineral for plant roots is in the _____.
a) B- horizon b) C- horizon
c) A- horizon d) Surface soil

2) The proportion of sand, slit and clay determines _____ of soil.
a) structure b) texture
c) fertility d) nutritional potential

3) _____ influences soil formation.
a) Climate b) Vegetation
c) Parent rock d) All of these

4) Aroma of earthy smell in first shower of monsoon is due to _____.
a) Actinomycetes b) Mycoplasma
c) Mycobacterium d) Fungi

5) Most of the soil microorganisms are _____.
a) Thermophiles b) Psychrophiles
c) Mesophiles d) Sterothemophiles

6) _____ is example of chemical weathering.
a) Frost action on rocks b) Repeated drying
c) Repeated wetting d) Oxidation of minerals in rocks

7) The quantity of DDT at each trophic level in the food chain _____.
a) decreases b) remains same
c) increases d) changes

8) _____ is ring disease of plants.
a) Citrus can b) Black arm of potato
c) Wilt of potato d) None of these

9) _____ is the best example of microbial insecticide.
a) *Bacillus polymixa* b) *Bacillus subtilis*
c) *Bacillus anthracis* d) *Bacillus thuringiensis*

10) _____ is excellent biofertilizer.
a) Salvinia b) Pteridium
c) Azolla d) Marsilea

B) Answer in one word. **06**

1) Which chemical is used to create drought tolerance in tissue culture?
2) Which is nitrogen fixing blue green algae.
3) Which are the components of microbial ecosystem in soil.
4) Which organism play key role in the transformation of rock to soil.
5) Which organism is capable of sulfur oxidation?
6) Who is father of soil microbiology.

Q.2 Solve any Eight of the following. **16**

a) Define nitrification.
b) Define denitrification.
c) List non-symbiotic nitrogen fixing bacteria.
d) Formation of VA mycorrhiza.
e) Enzymes involved in cellulose degradation.
f) Give purpose of the Winogradsky's column.
g) Which is nitrogen fixing stage of *Rhizobium*.
h) Function of leghemoglobin.
i) List different forms phosphorus found in soil.
j) List crops involved in symbiotic nitrogen fixation.

Q.3 A) Attempt any Two. **10**

1) Role of microorganisms in soil fertility
2) Different properties of soil
3) Concept of viral pesticides

B) Write short note. **06**

Control measures of plant diseases.

Q.4 A) Attempt any Two. **08**

1) Whip smut of sugarcane
2) Vermicompost
3) Soil ecosystem

B) Explain in detail Bioinsecticides. **08**

Q.5 Attempt any Two. **16**

a) Biodegradation of Lignin
b) Production and applications of Azo-fertilizer
c) Common symptoms produced by plant pathogens

SLR-DA-189

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
Electronics (Special Paper- X)
Fundamentals of Microcontroller (19201549)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagram wherever necessary.
4) Use of log table and calculators is allowed.

Q.1 A) Select the correct alternative for the following. **10**

1) Microcontroller uses _____ memory architecture.
a) Von Neumann b) RISC
c) CISC d) none of these

2) The first address of Bank-3 registers is _____.
a) 08 H b) OF H
c) 18 H d) 1F H

3) Which one of these pins of μC 8051 is used to latch the address?
a) $\overline{EA}$ b) ALE
c) $\overline{PSEN}$ d) $RESET$

4) To configure the parallel port as an output-port, _____ hex value is sent to the port.
a) 00 H b) 55 H
c) AA H d) FF H

5) What is the address range of bank registers?
a) 00-1F H b) 20-7F H
c) 00-7F H d) 80-FF H

6) How many addressable bits of RAM is present in μC 8051?
a) 8 b) 16
c) 32 d) 128

7) If the data value 45H is ORed with 68H, the result is_____?
a) 40 H b) 6D H
c) 2D H d) AD H

8) Which one of these figures is not a standard baud rate?
a) 512 b) 600
c) 2400 d) 4800

9) What is the maximum delay generated by the timer having 12 MHz crystal frequency and operating in Mode-2?
a) 128 μS b) 256 μS
c) 512 μS d) 65536 μS

10) Which one of these instructions should be used for copying the external RAM memory data to the accumulator?
a) MOVX A, @DPTR b) MOVX @DPTR,A
c) MOVC A, @A+DPTR d) MOVC A, @PC

B) Answer in short / Fill in the blanks. **06**

1) Write a long jump instruction used in microcontroller 8051.
2) Which control register is used to enable / disable the interrupts?
3) MOV DPRT,#data is _____ byte instruction?
4) The result of adding the data values 64 H and 58 H will be?
5) To configure port pin P1.5 as an output pin, the instruction used will be _____.
6) Draw the flowchart symbol used for process control.

Q.2 Attempt any eight. **16**

a) Difference between Power on RESET and manual RESET in uC8051?
b) Give the significance of PSEN pin.
c) State the function of TR0 and TF0 bits in μC 8051.
d) Write any two direct and indirect register addressing instructions.
e) Explain with suitable example the RRA instruction.
f) Give the relationship between Timer Clock frequency and Crystal frequency.
g) Justify, why the address and data buses are multiplexed in uC8051.
h) Draw the data format of TMOD register and explain.
i) List the interrupt vector addresses in μC 8051.
j) Give the difference between bit-addressable and byte-addressable SFR.

Q.3 A) Attempt any two. **10**

1) Draw the block diagram for PORT-1 of μC 8051 and explain in brief.
2) List the differences between microprocessor and microcontroller.
3) Write an assembly language program to add two 8-bit numbers, 47H and 58H, and save the result.

B) Write an ALP to exchange ten bytes of data between RAM locations 30H-39H and 40H-49H. **06**

Q.4 A) Attempt any two. **08**

1) Draw the basic block diagram of μC 8051 and explain the bus structure.
2) Draw the structure of internal 128 byte RAM.
3) Explain atleast four single bit instructions of uC8051.

B) Draw the flowchart and write an assembly language program to multiply two 8-bit numbers, 35H and 24H. Save the quotient and remainder in external RAM addresses. **08**

Q.5 Attempt any two. **16**

a) Discuss the classification of data transfer instructions in μC 8051 with suitable example for each.
b) Write an assembly language program to generate 1KHz square-wave on port pin P1.0 using Timer-1 in mode-0. Assume a crystal frequency of 12 MHz.
c) Explain the internal architecture of uC8051 with suitable diagram.

SLR-DA-190

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Special Paper - X)
Core Java (19201544)

Day & Date: Monday, 04-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Choose the correct alternative. **10**

1) _____ is not a feature of Java programming.
   a) Dynamic b) Architecture Neutral
   c) Use of pointers d) Object-oriented

2) Which keyword is used for accessing the features of a package?
   a) package b) import
   c) extends d) none of these

3) _____ is super class of all the classes in the Java.
   a) object b) string
   c) Abstract class d) none of these

4) JRE stands for _____.
   a) Java Runtime environment
   b) Java Rapid Enterprise
   c) java Realtime environment
   d) all of these

5) _____ Keyword is used to create abstract class in java.
   a) static b) abstract
   c) virtual d) none of these

6) Which of these access specifiers can be used for an interface members?
   a) Private b) Public
   c) Protected d) none of these

7) keywords is not a part of exception handling _____.
   a) try b) catch
   c) finally d) final

8) Runnable is a _____.
   a) class b) interface
   c) object d) none of these

9) Java source files are compiled and converted to _____ code.
   a) object b) byte
   c) machine d) executable

10) _____ is jumping statement in java.
   a) if b) break
   c) while d) none of these

B) Fill in the blank. **06**

1) _____ is a developer of java.
2) _____ statement is used to throw exception from program explicitly.
3) Exception created by try block is caught in _____ block.
4) The JVM stands for _____.
5) For executing a statement or a block of codes repeatedly a specified number of times _____ loop is used.
6) A class inherits state and behaviour from its _____.

Q.2 Solve any Eight of the following. **16**

1) Write a note on finally block.
2) Write a note on vector collection class.
3) Define Abstract class.
4) What is JVM?
5) Write a note on stream reader and stream writer.
6) What is Thread priorities?
7) What are the use of super keyword?
8) What is use of finally block?
9) What is interface?
10) Write a note on Array in Java.

Q.3 A) Attempt any Two of the following. **10**

1) Write a note on JCheckBox, and JButton.
2) Write a program for constructor overloading.
3) What is use of wait and notify method?

B) What are access specifies used in Java? Explain. **06**

Q.4 A) Attempt any Two of the following. **08**

1) What is exception? Explain use of throw and throws.
2) Explain for loop with example.
3) Explain Structure of Java Program.

B) Explain thread lifecycle in java with example. **08**

Q.5 Attempt any Two of the following. **16**

a) Write a java program to implement an interface.

b) Explain features of Java programming language in detail.

c) Write a GUI application by using swing component for addition of two numbers.

SLR-DA-191

Seat No.	

Set P

B.Sc. (Semester-V) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Special Paper-XI)
Organic Chemistry (19201508)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary.
3) Figures to 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) In mass spectrum, intensity assigned to base peak is _____.
   a) 50% b) 80%
   c) 0% d) 100%

2) Hoffmann rearrangement is _____ rearrangement.
   a) Intermolecular b) Intramolecular
   c) Both (a) & (b) d) None of these

3) The nuclei having spin _____ are known as magnetic nuclei.
   a) $I = 0$ b) $I > 0$
   c) $I < 0$ d) None of these

4) IR Spectroscopy is mainly useful in the determination of _____.
   a) conjugation b) functional group
   c) molecular weight d) None of these

5) Tautomerism is shown by _____.
   a) Chloroform b) Ethyl acetoacetate
   c) Acetic acid d) Grignard reagent

6) The most least stable conformation of cyclohexane is _____.
   a) Boat b) Twist boat
   c) Chair d) Half chair

7) The ratio of signifying a triplet is, _____.
   a) 1:1:1 b) 1:3:1
   c) 1:2:1 d) 2:1:2

8) In Oppenauer oxidation reaction, alcohol is converted into _____.
   a) Acid b) Aldehyde
   c) Amine d) Alkene

9) Condensation of EAA with urea in presence of phosphoryl chloride gives _____.
   a) Antipyrine b) Crotonic acid
   c) Cinnamic acid d) 4-methyl uracil

10) Higher δ value of proton implies _____ shift.
   a) Flipping b) Upfield
   c) Downfield d) Resonance

B) Fill in the blanks/Definition. **06**

1) In NMR spectroscopy _____ radiations are used.
2) According to Sachse-Mohr theory, strinless ring acquires _____ structure.
3) Vibrational frequency of a band can be calculated by using _____ law.
4) Define Chemical shift.
5) Define Confirmational isomerism.
6) Define tautomerism.

Q.2 Solve Any Eight of the following. **16**

a) How will you distinguish the following compounds by using IR spectroscopy.
1) CH_3-CH_2-OH
2) CH_3-CH_2-CHO

b) Predict the product and name the reaction.

c) Write the preparation of diethyl malonate.
d) Define shielding and deshielding effect with suitable example.
e) Draw the Newman's projection formulae of chair and boat conformations of cyclohexane.
f) Define Molecular ion peak with example.
g) Define the following
i) Equivalent proton
ii) Non-equivalent proton
h) State nitrogen rule. Give its importance.
i) Assign the structure of following compound by using IR data.
Mol. formula: $C_4H_8O_2$
IR: 2950, 1740, 1250 cm^{-1}
j) Define coupling constant with suitable example.

Q.3 A) Attempt any Two of the following. **10**

1) Explain Wittig reaction with mechanism.
2) Explain the term locking of conformation with suitable example.
3) Discuss the applications of Mass spectroscopy.

B) Short note/Solve **06**

Write a note on Oppenauer oxidation reaction and give its application.

Q.4 A) Attempt any Two of the following. **08**

1) Explain equatorial methyl cyclohexane is more stable than the axial methyl cyclohexane.
2) Discuss the various types of fundamental modes of vibrations.
3) How will you prepare the following from Diethyl malonate.
1) Alanine (α-amino acid)
2) Barbituric acid

B) Describe/Explain/Solve **08**

Explain the conformations of cyclohexane with energy profile diagram.

Q.5 Attempt any Two of the following. **16**

1) What is reactive methylene group? How will you prepare the following from EAA?

1) Ethyl-2-ethyl acetoacetate
2) Crotonic acid
3) 4-Methyl uracil

2) An organic compound A [$C_6H_{14}O$] has a t-methyl group and absorbs at 3300 cm^{-1}. On oxidation it yields a ketone carrying the same number of carbon atoms. On heating with cone. HCl, it yields compound B [$C_6H_{13}Cl$] which on hydrolysis gives compound C [$C_6H_{14}O$], Name the reaction and identify A, B and C.

3) Assign the structure of following compounds by using spectral data.

1) $\mathrm{MF: C_9H_{10}O_2; IR: 1745, 1225, 749, 697\ cm^{-1}; PMR: 1.96\ \delta(s, 3H), 5.0\ \delta(s.\ 2H), 7.22\delta(s, 5H)}$
2) $\mathrm{MF: C_4H_7O_2Br; PMR: 4.2\ \delta(1H, t), 1.1\delta(3H, t), 2.10\ \delta(2H, quintet), 10.5\ \delta(1H, s)}$

SLR-DA-192

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XI)
Molecular Biology (19201503)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) DNA replication is possible due to _____.
   a) Phosphate bond b) Complementary base paring
   c) Hydrogen bond d) Covalent bond

2) Size of prokaryote ribosome is _____.
   a) 80S b) 70S
   c) 40S d) 60S

3) The transcription stops when RNA polymerase reaches a point of DNA is called _____.
   a) Initiator b) Terminator
   c) Co-ordinator d) Promotor

4) Translation initiated with the help of energy rich molecule _____.
   a) CTP b) GTP
   c) ATP d) TTP

5) Pentose sugar + Nitrogen base + Phosphate group = _____.
   a) Nucleotide b) Nucleoside
   c) Riboside d) Galactosid

6) Nitrogen bases of DNA are _____.
   a) Adenine and Uracil
   b) Uracil and Thymine
   c) Adenine, Guanine, Cytosine and Thymine
   d) Adenine, Guanine, Cytosine and Uracil

7) The DNA fragments are joined with the help of enzyme _____.
   a) endonuclease b) polymerase
   c) ligase d) primase

8) DNA structure as a ladder was developed by _____.
   a) Watson and crick b) William Astbury
   c) Rosalind Franklin d) Franklin and Wilkins

9) _____ is the father of molecular biology.
   a) Linus Carl Pauling b) James Watson
   c) Francis H. Crick d) Mahlon B. Hoagland

10) Mode of DNA replication in E. coli is _____.
   a) semi conservative b) dispertive
   c) intermsdiate d) conservative

B) Give Answer in one sentence answer. **06**

1) What is a start codon?
2) Define Okazaki fragments?
3) What is DNA?
4) Enlist the types of RNA.
5) Define - Translation.
6) Name the two enzymes involved in DNA replication.

Q.2 Solve any Eight of the following. **16**

1) What are the different forms of DNA?
2) What is semi-conservative replication of DNA?
3) Define Denaturation and renaturation of DNA.
4) What are the transcription factors? Name the two transcription factors.
5) Write Charging of t-RNA.
6) What are the difference between DNA &RNA?
7) What is Organization of DNA in eukaryotes.
8) Sketch and label the structure of ribosome.
9) Write a Replication of DNA in prokaryotes.
10) What are the functions of RNA?

Q.3 A) Attempt any Two of the following. **10**

1) Give the detailed account regulation of lactose metabolism in *E.coli*
2) What is post translational modifications of proteins? Explain it's types.
3) Give a brief account on replication of DNA in eukaryotes.

B) Process of transcription in prokaryotes. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain in detail the Watson & Crick model of DNA.
2) Explain: DNA as the carrier of genetic information. (Grifith's experiment)
3) Note on: Synthesis of DNA. (Kornberg's discovery)

B) Explain the principles of transcriptional regulation in prokaryotes & eukaryotes. **08**

Q.5 Attempt any Two of the following. **16**

a) Describe the steps involved in protein synthesis.
b) What is RNA? Explain the types of RNA in details
c) What are the salient features of double helix? Give the account on the 'Central Dogma of Molecular Biology.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Special Paper XI)
Endocrinology (19201522)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagram wherever necessary.
3) Figures to right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) The dustless gland is known as _____.
   a) endocrine b) exocrine gland
   c) both a and b d) None of these

2) Which of the following is NOT neurohormones?
   a) Norepinephrine b) Oxytocin
   c) vasopressin d) Testosterone

3) Circadian rhythm controlled by _____ gland.
   a) Thyroid b) parathyroid
   c) tests d) Pineal

4) Hypothalamus is a part of _____.
   a) Mid brain b) fore brain
   c) hind brain d) future brain.

5) Pituitary gland is divided anatomically into an _____.
   a) adenohypophysis b) neurohypophysis
   c) both a 4b d) None of the above

6) Pars intermedia secrets only one hormone.
   a) MSH b) ADH
   c) FSH d) LH

7) Hormone regulates the formation of milk _____.
   a) Thyroid hormone b) prolactin
   c) parathyroid hormone d) ACTH

8) Gonadotrophins Produced by two hormones.
   a) LH b) FSH
   c) both a and b d) androgen

9) Ovulation is induced by _____.
   a) FSH b) LH
   c) MSH d) TSH

10) _____hormones produced by placenta
   a) Estrogen b) Progesterone
   c) relaxin d) all of these

B) Fill in the blank. **06**

1) Thyroxine hormone produced by _____.
2) Parathyroid hormone produced by _____.
3) Cortisol hormone produced by _____.
4) Insulin hormone produced by _____.
5) Estrogen & progesterone produced by _____.
6) Testosterone produced by _____.

Q.2 Solve any eight of the following. **16**

1) Hormones
2) ACTH
3) Functions of adrenal gland…
4) Location of parathyroid & function
5) Hypothyroidism
6) Disorder of testis.
7) Neurosecretion
8) Neurohormones
9) Oxytocin
10) ADH

Q.3 A) Attempt any Two of the following. **10**

1) Explain characteristics of endocrine gland.
2) Describe disorder of pituitary gland.
3) Explain hormonal action at cellular level.

B) Describe the role of anterior pituitary gland in endocrine system. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Describe structure & function of placenta.
2) Explain structure, hormones, and it role in endocrinology of ovary.
3) Role of posterior pituitary hormones.

B) Give structure, Hormones, functions of testis. **08**

Q.5 Attempt any Two of the following. **16**

a) Describe location & structure, their function of pineal gland.
b) Explain classification of hormones.
c) Describe feedback mechanism hypothalamus.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - XI)
Real Analysis (19201526)

Day & Date: Tuesday, 05-12-2023 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) If f and g are functions from $\mathbb{R}$ to $\mathbb{R}$ such that $f(x) = 3x - 1$ and $g(x) = x^2 + 1$ then fog = _____.
   a) $3x^2 + 2$ b) $x^2 - 3x$
   c) $9x^2 - 6x + 2$ d) $3x^2 - 2$

2) A set 'A' is countable if 'A' is equivalent to the set of _____.
   a) Real number b) Rational number
   c) Irrational number d) Positive integer

3) Which of the following is wrong?
   a) $f(X \cup Y) = f(X) \cup f(Y)$ b) $f^{-1}(X \cup Y) = f^{-1}(X) \cup f^{-1}(Y)$
   c) $f(X \cap Y) = f(X) \cap f(Y)$ d) $f^{-1}(X \cap Y) = f^{-1}(X) \cap f^{-1}(Y)$

4) The sequence $\{(-1)^{n-1}\}$ is _____.
   a) Only bounded below b) Only bounded above
   c) Bounded d) Unbounded

5) If $a_n \leq b_n \leq c_n$ and $\lim_{n\to\infty} a_n = 5 = \lim_{n\to\infty} c_n$ then $\lim_{n\to\infty} b_n$ = _____.
   a) 0 b) 5
   c) ∞ d) does not exists

6) The series $\sum_{n=2}^{\infty} \frac{1}{n(\log n)^P}$ is convergent if _____.
   a) $P = 1$ b) $P < 1$
   c) $P \leq 1$ d) $P > 1$

7) If $\lim_{n\to\infty} \frac{S_n}{n} = L \neq 0$ then $\{S_n\}_{n=i}^{\infty}$ is _____.
   a) Bounded b) Not bounded
   c) Oscillates d) Monotonic

8) Every bounded monotonic sequence is _____.
   a) Divergent b) Convergent
   c) Oscillates d) Unbounded

9) The series $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \cdots$ is _____.
   a) Divergent b) Convergent
   c) Alternating d) Oscillates

10) A series obtained from a given convergent series by grouping of its terms is _____.
   a) Diverges
   b) Converges to same limit
   c) Both converges or diverges
   d) Converges to different limit

B) Fill in the blanks. **06**

1) If $f: A \to B$ and $X \subset A$ define $g: X \to B$ by $g(x) = f(x), \forall\, x \in X$ then g is called _____.
2) If $f(x) = \log x, 0 < x < \infty$ and $A = [0,1]$, then $f^{-1}(A) =$ _____.
3) A monotonic increasing sequence which is _____ diverges to ∞.
4) A sequence is a function f from _____ to the set of real number.
5) The series $1 + r + r^2 + r^3 + \cdots$ is oscillatory if _____.
6) If the series $\sum_{n=1}^{\infty} a_n$ converges then $\lim_{n\to\infty} a_n = 0$ is ___ condition but __

Q.2 Solve any Eight of the following. **16**

a) If $f(x) = \sin x$ then find $f[0, \frac{\pi}{6}]$ and $f[\frac{\pi}{6}, \frac{\pi}{2}]$

b) Define characteristic function and prove that $\chi_{A'} = 1 - \chi_A$

c) Prove that set of even natural number is countable.

d) Prove that every convergent sequence converges to unique limit.

e) If $\lim_{n\to\infty} S_n = L$ and $\lim_{n\to\infty} t_n = M$ then prove that $\lim_{n\to\infty} (S_n + t_n) = L + M$

f) Write the formula for the sequence.
$1, -3, 5, -7, 9, -11, 13, -15, \ldots \ldots \ldots$

g) Define Oscillatory sequence with example.

h) Discuss the convergence of series $\sum_{n=1}^{\infty} \frac{n+2}{10^{10}(n+3)}$

i) Define absolute convergence and conditional convergence of series.

j) State the Root test for absolute convergence.

Q.3 A) Attempt any Two of the following. **10**

1) Prove that countable union of countable set is countable.
2) Prove that every convergent sequence is bounded but the converse is not true.
3) Prove that the series $\sum(\sqrt{n^4 + 1} - n^2)$ is convergent.

B) State and prove Nested Interval theorem. **06**

Q.4 A) Attempt any Two of the following. **08**

1) If A and B are countable sets then prove that $A \times B$ is countable.
2) Prove that the sequence $\left\{\left(1 + \frac{1}{n}\right)^n\right\}$ is convergent.
3) Prove that if series $\sum a_n$ converges absolutely, then the series $\sum a_n$ converges but not conversely.

B) For any two sets A and B. Prove that **08**

1) $(A \cup B)' = A' \cap B'$
2) $(A \cap B)' = A' \cup B'$

Q.5 Attempt any Two of the following. **16**

a) Define, difference and symmetric difference of two sets and prove that, for any two sets A and B

$A \Delta B = (A - B) \cup (B - A)$

b) Define limit superior and limit inferior of sequence and prove that, if $(S_n)_{n=1}^{\infty}$ and $(t_n)_{n=1}^{\infty}$ are bounded sequence of real number then show that

$$\lim_{n\to\infty} \sup(s_n + t_n) \leq \lim_{n\to\infty} \sup s_n + \lim_{n\to\infty} \sup \mathrm{t_n}$$

c) Define alternating series, state and prove the Leibnitz test for convergence of alternating series.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - XI)
Sampling Techniques (19201530)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternative. **10**

1) A sample consists of _____.
a) all units in the population
b) 50 per cent units in the population
c) 5 per cent units in the population
d) any fraction of the population

2) An estimator can possess _____.
a) a fixed value b) any value
c) both a) & b) d) neither a) nor b)

3) 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

4) 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

5) Sapling errors can be reduced by _____.
a) choosing a proper probability sampling
b) selecting a sample of adequate size
c) using a suitable formula for estimation
d) All the above

6) 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

7) 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

8) The discrepancies between estimate and population parameter is known as _____.
a) human error b) sampling error
c) non-sampling error d) none of these

9) The errors in a survey other than sampling error are called _____.
a) formula error b) planning error
c) non- sampling error d) None of the above

10) Regarding the number of strata, which statement is true?
a) lesser the number of strata, better it is
b) more the number of strata, poorer it is
c) more number of strata, better it is
d) not more than ten items should be there in a stratum

B) Define the following. **06**

1) Sampling unit
2) Population unit
3) Random sampling
4) Sampling error
5) Non-sampling error
6) Sampling frame

Q.2 Solve any Eight of the following. **16**

a) Define census method.
b) What is difference between sample and population.
c) State the characteristics of good questionnaire.
d) Define non- sampling error.
e) Give a real-life situation where stratified sampling is used.
f) Give a real-life situation where cluster sampling is used.
g) Give any two real life situations where census method is not preferable over sampling.
h) What is meant by proportional allocation?
i) State the objectives of sample survey.
j) Give a real-life situation where systematic sampling is used.

Q.3 A) Attempt any Two of the following. **10**

1) Explain regression estimators of population mean.
2) Describe stratified random sampling procedure.
3) Show that ratio estimator is biased.

B) Write short note on systematic sampling. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain sampling for proportion, Obtain it's unbiased estimator for population proportion.
2) Describe, in brief the cluster sampling.
3) Find under what condition ratio estimate is more efficient than SRS.

B) Describe the idea of two-stage and multistage sampling in details. **08**

Q.5 Attempt any Two of the following. **16**

a) In presence of linear trend of the form $Yi = a + bi;\ i = 1, 2, \ldots, N,$ compare SRSWOR, Stratified random sampling and systematic sampling.
b) Draw all possible samples of size 3 using systematic sampling when population consists of units 1, 2, 3, 4, 5, 6, 7, 8, 9.
c) 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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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper - XI)
Applied Geology – Engineering Geology (19201536)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Fill in the blanks. **10**

1) Preparation of geological map is done in the _____ stage of the civil engineering project.
   a) planning stage b) post construction stage
   c) design stage d) construction stage

2) Which of the following test can detect presence of subsurface unconformity?
   a) Photogeological interpretation
   b) seismic
   c) drill core
   d) magnetic survey

3) Electrical resistivity method is based on measurement of _____.
   a) Specific resistance b) Voltage
   c) Potential drop d) Current

4) Which type of compressive strength is taken as the most important index property of stones?
   a) Confined b) Drained
   c) Undrained d) Unconfined

5) According to engineering classification rocks, rocks with compressive strength 1120-2240 kg/cm^3 are classified as, _____
   a) medium strength type and class C
   b) medium strength type and class B
   c) high strength type and class B
   d) high strength type and class C

6) Moderately altered / weathered rocks occur in _____ grade of soil.
   a) III b) IV
   c) V d) VI

7) Which type of mass movement occurs on gentle slope whose angle between 2^0 and 5^0?
   a) Creep b) rapid flowage
   c) sliding d) toppling

8) The type of dam that requires an impermeable membrane is:
   a) concrete dam b) rock-fill dam
   c) earth dam d) masonry dam

9) A tunnel passing through core of syncline and align parallel to fold axis is _____ site.
   a) Favourable b) unfavourable
   c) Both a) and b) d) cannot say

10) Two types of embarkment dams are:
   a) Weirs and bandhara b) arch and buttress
   c) Earth fill and rock fill d) gravity and arc

B) Answer the following questions in one sentence. **06**

1) In which stage of the civil engineering project, geophysical surveys are carried out?
2) What is the purpose of Auger drilling method?
3) Which rock material can be used as a roofing material?
4) Siliceous sandstone has more porosity than calcareous sandstone. True/false.
5) What is alluvial soil?
6) Which type of dam usually has a triangular profile and can resist the forces by its own weight?

Q.2 Solve any Eight of the following. **16**

1) Name three major types in classification of mass movement.
2) What are the particle sizes of aeolian soil?
3) What is overburden in civil engineering?
4) What is crown of tunnel?
5) What are heel and toe of the dam?
6) Name the types of dams.
7) What are lahars?
8) Define rock mechanics.
9) Give mathematical expression of uniaxial compressive strength.
10) What are three types of aerial photographs?

Q.3 A) Attempt any Two of the following. **10**

1) What is sliding?
2) What are utilities of dams?
3) Write a note on tensile strength.

B) Write a short note on feasibility / design stage of site investigations. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Describe in brief hydraulic and traffic tunnels.
2) Classification of soils depending upon grades of weathering.
3) What are methods of sub-soil exploration?

B) Explain role of gravity in mass movement. **08**

Q.5 Attempt any Two of the following. **16**

a) What is shear strength? Explain it with appropriate figure.
b) Describe various concrete dams.
c) Describe various geological structures which may cause landslide event.

SLR-DA-197

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - XI)
Immunology (19201541)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw a neat labelled diagram wherever necessary.

Q.1 A) Multiple choice questions. **10**

1) Autoimmune hemolytic anemia (AHA) is an example of _____.
   a) type I hypersensitivity b) type II hypersensitivity
   c) type III hypersensitivity d) type IV hypersensitivity

2) Monoclonal antibodies are _____.
   a) heterogeneous antibodies produced from single clone of plasma cells
   b) homogeneous antibodies produced from single clone of plasma cells
   c) both a and b
   d) None of these

3) Classical pathway of complement system is activated by _____.
   a) antibody antigen complexes b) antigen
   c) antigenic peptides d) antigens bound to MHC

4) What is the name of MHC in humans?
   a) HLA. b) H2.
   c) Adjuvants d) Haplotypes

5) In the context of the ABO blood group, a transfusion of AB blood may be given to a person who has blood type _____.
   a) A. b) O.
   c) B. d) AB

6) In type I hypersensitivity, early response which occurs with minutes, early mediator formed is _____.
   a) histamine b) leukotrienes
   c) prostaglandins d) all of the above

7) In hybridoma technology, hybrid cells are selected in _____.
   a) MS medium b) HAT medium
   c) X- gal medium d) whites medium

8) Complement system is involved in _____.
   a) specific defense b) nonspecific defense
   c) both a and b d) none of these

9) Which antibodies are formed in the plasma of a person with type A blood?
   a) anti A b) anti B
   c) both anti A and anti B d) neither anti A nor anti B

10) Name the cell which receives antigen presented by MHC molecule.
a) NK cells b) B cells
c) T cells d) Macrophages

B) Define the following. **06**
1) Macrophages
2) Humoral response
3) Major histocompatibility complex
4) Monoclonal antibodies
5) Hypersensitivity
6) Rh blood group

Q.2 Solve any Eight of the following. **16**
1) NK cells
2) Primary immune response
3) Graft rejection
4) Components of complement
5) Atopy
6) Cells involved in delayed type of hypersensitivity
7) Diagram of secondary lymphoid organ spleen
8) Bone marrow
9) HLA typing
10) Hemocytolytic autoimmune disease

Q.3 A) Attempt any Two of the following. **10**
1) Anaphylaxis
2) Pernicious anemia
3) MALT

B) Types of grafts **06**

Q.4 A) Attempt any Two of the following. **08**
1) Structure and function of myeloid cells
2) Biological effects of complement
3) ABO blood group system

B) Write a note on applications of monoclonal antibodies. **08**

Q.5 Attempt any Two of the following. **16**
a) Blood transfusion reaction and it's complication.
b) Mechanism of pathogenesis of type III hypersensitivity.
c) Classes of MHC molecules - structure and their role.

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Seat No.	

Set P

B.Sc. (Semester-V) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Special Paper - XI)
Sensors and Transducers (19201550)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of log-tables and calculator is allowed.
5) Use of Mobile is strictly prohibited.

Q.1 A) Multiple choice questions. **10**

1) The smallest quantity of the input quantity to which the measurement system responds is called _____.
   a) Accuracy b) Resolution
   c) Precision d) Error

2) Which of these transducers is an active transducer?
   a) thermocouple b) piezoelectric
   c) photovoltaic cell d) all of these

3) Which one of these is not a measurement system?
   a) pH meter b) multimeter
   c) signal generator d) weighing machine

4) The load cell used in electronic weighing system consists of _____ transducer.
   a) potentiometer b) RTD
   c) thermistor d) strain gauge

5) The transducer used to measure linear displacements is _____.
   a) LDR b) LVDT
   c) strain gauge d) all of these

6) In resistive transducer, the resistance depends upon _____.
   a) temperature b) pressure
   c) displacement d) all of these

7) The temperature transducer having negative temperature coefficient of resistance is _____.
   a) thermistor b) thermocouple
   c) RTD d) mercury thermometer

8) _____ sensor is used for LPG gas leakage.
   a) N-26 b) LM-35
   c) PIR d) photovoltaic cell

9) Which one of these is an actuator?
   a) electromagnetic relay b) LDR
   c) LVDT d) pyrometer

10) "When a current is applied to a thin strip of metal in presence of perpendicular magnetic field, produces a potential difference between two sides of the strip" is the principle of operation of _____.

a) LM35 b) pyrometer
c) PIR d) hall effect transducer

B) Answer in one sentence/fill in the blanks/definitions/one word answer. 06

1) What is passive transducer?
2) Give the full-form of LVDT.
3) Name any two temperature sensitive transducers.
4) What is optocoupler?
5) Give the principle of operation of thermocouple.
6) What is an error? Define.

Q.2 Solve any Eight of the following. 16

1) What is the principle of transduction?
2) Give basic difference between sensor and transducer.
3) Explain the principle of operation of LDR.
4) Give the applications of optocoupler.
5) Give the principle of operation of RTD.
6) Explain the need of system calibration.
7) Explain the principle of operation of carbon microphone.
8) What is meant by dynamic characteristics of the sensors?
9) Give the construction of photo-diode.
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 basic needs of measurement.
2) Explain variable reluctance transducer.
3) Explain the construction and operation of solenoid valve.

B) Write a note on RVDT. **06**

Q.4 A) Attempt any Two of the following. 08

1) Write a short note on LPG sensor N-26.
2) Explain the selection criterion for transducers.
3) What is pyrometer? Explain.

B) Draw the block diagram of a measurement system and explain each block. **08**

Q.5 Attempt any Two of the following. 16

a) Discuss the static characteristics of a measurement system.
b) Explain photo-diode and photo-transistor transducers. Give any one application.
c) Discuss variable air gap and variable permittivity type capacitive transducers.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
Computer Science (Special Paper - XI)
Operating System (19201545)

Day & Date: Tuesday, 05-12-2023 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) 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 _____entity.
   a) passive b) active
   c) non active d) none of these

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 degree of Multiprogramming is controlled by _____.
2) The banker's algorithm is used for deadlock _____.
3) _____ address is generated by CPU.
4) Physical memory is broken into fixed-sized blocks called _____.
5) In a segmentation scheme the logical memory will be divided into _____.
6) _____ algorithm has lowest page fault rate.

Q.2 Solve any Eight of the following. **16**

1) What are the three main purposes of an operating system?
2) Define Multiprogramming operating System.
3) What is mean by Threads?
4) What is mean by Race Conditions?
5) Define System Model.
6) What is mean by Process Synchronization?
7) Define Logical and Physical address space.
8) Define Paging.
9) Define the term File.
10) Define disk scheduling.

Q.3 A) Attempt any Two of the following. **10**

1) Explain the different Services provided by Operating System?
2) Define the term process. Describe the contents of a Process Control Block (PCB).
3) Define the term deadlock. Explain the necessary conditions for deadlock to occur.

B) Short Note. **06**

1) System Calls
2) File System structure

Q.4 A) Attempt any two of the following. **08**

1) What is Scheduling? Explain Types of Schedulers?
2) Explain process state with diagram?
3) Explain different File type in storage management?

B) Explain with example working of RR and SJF scheduling algorithm. **08**

Q.5 Attempt any Two of the following. **16**

a) What is page replacement? Write the working of LRU page replacement algorithm.
b) Explain the Reader-Writer problem in detail.
c) Explain Bankers algorithm with example.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Special Paper - XII)
Nuclear Physics (19201514)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculators is allowed.
5) Neat diagrams must be drawn wherever necessary.

Q.1 A) Choose the correct alternative from the options. **10**

1) Radius of nucleus is given by _____.
   a) $R = R_0 A^{2/3}$ b) $R = R_0 A^{1/3}$
   c) $R = R_0 A^{2}$ d) $R = R_0 A^{1/2}$

2) Elements with $A < 12$ have _____ packing fraction.
   a) positive b) negative
   c) zero d) infinite

3) The bombarding particle in the nuclear reaction is called _____.
   a) target b) projectile
   c) product d) striker

4) In betatron, electron is made to move in a _____ orbit
   a) fixed elliptical b) fixed circular
   c) different d) different elliptical

5) Relativistic increase in mass of the ion is the limitation of _____.
   a) Cyclotron b) synchrocyclotron
   c) synchrotron d) betatron

6) Cyclotron working on the principle of _____.
   a) Fixed frequency magnetic resonance
   b) variable frequency magnetic resonance
   c) Fixed frequency electric resonance
   d) variable frequency electric resonance

7) In scintillation counter, the phosphor converts energy of the incoming particle into _____.
   a) heat b) sound
   c) light d) current

8) In K-electron capture, the atomic number of the product nucleus _____.
   a) increases by 1 b) decreases by 1
   c) increases by 2 d) remains same

9) T_α and Q_α are $K.E.$ and disintegration energy of α particle _____.
   a) $T_\alpha > Q_\alpha$ b) $T_\alpha = Q_\alpha$
   c) $T_\alpha < Q_\alpha$ d) $T_\alpha \gg Q_\alpha$

10) The field particle in electromagnetic force is _____.
a) muon b) pion
c) photon d) positron

b) Fill in the blanks. **06**

1) Betatron works on the principles of _____.
2) The minimum energy required to break the nucleus into its constituent particle is called _____.
3) The particle having 0 or integral spin are called _____.
4) In G.M. counter the central electrode wire is kept at _____ potential.
5) Neutrino hypothesis was postulated by _____.
6) _____ is antiparticle of electron.

Q.2 Solve any Eight of the following. **16**

a) Define binding energy of nucleus.
b) What is meant by mass defect?
c) What is the principle of scintillation counter?
d) What is accelerator? What is its need?
e) What are limitations of Cyclotron?
f) Draw neat diagram of Scintillation counter.
g) Explain dead time in G.M. counter.
h) State the properties of neutrino by Pauli's neutrino hypothesis.
i) What is quark?
j) Explain pick- up reaction.

Q.3 a) Attempt any Two of the following. **10**

1) Explain liquid drop model of nucleus in detail.
2) What is Q value of reaction? Explain exothermic and endothermic reaction.
3) Explain the classification of elementary particles.

b) Calculate Q Value of nuclear reaction ${}_7N^{14}(\propto, P)\ {}_8O^{17}$ and state its type of reaction. **06**

Given Mass of ${}_7N^{14} = 14.00753$ a.m.u.
Mass of ${}_2He^4 = 4.00387$ a.m.u.
Mass of ${}_8O^{17} = 17.00450$ a.m.u.
Mass of ${}_1H^1 = 1.00814$ a.m.u.

Q.4 a) Answer any Two of the following. **08**

1) Explain stripping reaction.
2) Derive an expression of disintegration energy of α particle.
3) Explain types of interaction.

b) Discuss β ray spectrometer to determine K.E. of β particle. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain construction and working of cyclotron.
b) Explain construction and working of GM counter. Explain Geiger Plateau region.
c) Derive the semi-empirical binding energy formula for a nucleus on the liquid drop model.

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Set P

B.Sc. (Semester – V) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Special Paper - XII)
Analytical and Industrial Physical Chemistry (19201509)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagrams and give equations wherever necessary.
4) Use of logarithmic tables and scientific calculator is allowed.

Q.1 a) Choose the most correct alternative of the following. **10**

1) The saturated calomel electrode at 298K has a potential of _____ on hydrogen scale.
   a) 0.02458 b) 0.2548
   c) 0.2458 d) 0.2485

2) A plot of galvanometer readings against concentration of a solution is called _____ curve.
   a) isotherm b) calibaration
   c) cyclic d) all of these

3) For anodising, in chromic acid process ____ tank is used as a cathode.
   a) steel b) lead
   c) iron d) glass

4) Flame photometry is less reliable than _____.
   a) coductometry
   b) potentiometry
   c) colorimetry
   d) atomic absorption spectroscopy

5) In colorimetric measurement _____ type of photocell is used.
   a) photoconductive b) photoemmisive
   c) photovoltaic d) none of these

6) The rapid analysis, using flame photometry can be carried out for the _____.
   a) alkali and alkaline earth metals
   b) inert gases
   c) halides
   d) rare earths

7) Resistance of the solution is measured with the help of _____.
   a) Potentiometric bridge b) Wheatstone bridge
   c) both a & b d) none of these

8) A glass electrode contains _____ M HCl.
   a) 0.01 b) 0.1
   c) 1.0 d) 0.001

9) For a given conductivity cell, the ratio ℓ / a represents _____.
   a) resistance b) cell constant
   c) conductance d) none of these

10) In Conductometric acid- base titration at the equivalence point _____ is formed.
   a) acid b) base
   c) salt d) all of these

b) Fill in the blanks. **06**

1) The formula $C_6H_4O_2.C_6H_4(OH)_2$ represents _____.
2) The equation $It = Io10^{-\epsilon ct}$ represents _____ law.
3) The correct unit of cell constant is _____.
4) The burner in which all sample enters the flame is called _____.
5) In nickel plating _____ % nickel anode are generally used.
6) For standardization of a potentiometer, a standard cell having voltage _____ is generally used.

Q.2 Solve any Eight of the following. **16**

a) State Lambert's law.
b) Write Faraday's laws of electrolysis.
c) What is Wheatstone bridge principle?
d) Explain the term electroforming.
e) How the temperature of the flame is controlled by flame photometry?
f) State Beer's law.
g) What do you mean by potentiometric titration?
h) What are the mineral acids?
i) What do you mean by conductometric titration?
j) Draw block diagram of flame spectroscopy.

Q.3 a) Attempt any two of the following. **10**

1) What are the features of burner in flame photometry?
2) How the cell constant is determined by using a standard solution?
3) Explain sulphuric acid method of anodizing.

b) Write a note on standardization of potentiometer **06**

Q.4 a) Attempt any Two of the following. **08**

1) What are the deviations of Beer's law?
2) Explain strong acid - strong base titration conductometrically.
3) Write a note on Anode and Cathode efficiency.

b) Explain in detail quinhydrone electrode. **08**

Q.5 Attempt any two of the following. **16**

a) What do you mean by anodising? Explain anodising methods.
b) Explain principle of flame photometry.
c) Describe in detail the single cell photoelectric colorimeter method.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XII)
Plant Breeding (19201504)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 6:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat diagrams and give equations wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Multiple Choice Questions. **10**

1) Crossing between different species of the same genes or different genera of the same family is called _____.
a) Distant hybridization b) Wide crossing
c) Both a) & b) d) Mutation

2) Role of distant hybridization in crop improvement is a _____.
a) Disease and insect resistant
b) Improvement in quality
c) Improvement in adaptation
d) all of the above

3) Pure line selection is also called _____.
a) Inbred selection b) Progeny selection
c) Single line selection d) All of the above

4) The oldest method of plant breeding is _____.
a) Introduction b) Selection
c) Hybridization d) Mutation breeding

5) Polygenic inheritance is also referred as a _____.
a) Quantitative inheritance b) Multiple gene inheritance
c) Both a) and b) d) None of the above

6) Method of selection in plants showing vegetative propagation is _____.
a) Pedigree selection b) Pure line selection
c) Clonal selection d) Mass selection

7) Selection of homozygous plant is _____.
a) Pure line selection b) Mass selection
c) Both a) and b) d) None of these

8) The quickest method of plant breeding is _____.
a) Introduction b) Selection
c) hybridization d) Mutation breeding

9) Which of the following is the unit of inheritance?
a) Phenotype b) Genotype
c) Gene d) Genome

10) Involving or controlled by a single gene is called _____.
a) Monogenic b) Mutagenic
c) Polygenic d) All of the above

B) Answer the following. **06**

1) Define introduction.
2) What is cross pollination?
3) Define polyploidy.
4) Define mutation.
5) Enlist methods of crop improvement.
6) What is hybridization?

Q.2 Solve any Eight of the following. **16**

a) What is monogenic inheritance'?
b) What is meant by domestication of plants?
c) Define aneuploidy.
d) What is self-pollination? Give the suitable examples of self-pollinated crops.
e) What is polygenic inheritance?
f) What is mutagen? Give suitable examples of mutagen.
g) Define euploidy.
h) Role of mutation in plant breeding.
i) Plant genetic resources.
j) Scope of plant breeding.

Q.3 A) Attempt any Two of the following. **10**

1) Explain in detail clonal selection method.
2) Give an account of centers of origin of crop plants.
3) Describe the role of polyploidy in plant breeding.

B) Write short note on the following. **06**

1) Distinguish in between monogenic vs polygenic inheritance.
2) Describe the role of distance hybridization in crop improvement.

Q.4 A) Attempt any Two of the following. **10**

1) Define mutation and describe its role in crop improvement.
2) Explain in detail mass selection method.
3) What is hybridization? Explain in detail hybridization process.

B) Describe/Explain/Solve the following **06**

1) Describe aim and objective of plant breeding.
2) Explain role of biotechnology in crop improvement.

Q.5 Attempt any two of the following. **16**

a) Briefly describe methods of production of Autopolyploid and their importance and limitations in crop improvement.
b) What is quantitative inheritance? Explain with example of Kernel colour in wheat.
c) What is selection? Describe pureline selection method.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XII)
Economic Botany (19201505)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) All questions carry equal marks.

Q.1 A) Rewrite the following sentences by choosing correct alternative. 10

1) The botanical name of chick-pea is _____.
a) *cicer arietinum* b) *phaselous mungo*
c) *phaselous vulgaris* d) all of these

2) Sesbania is native of _____.
a) Europe b) Africa
c) Tropical Asia d) Australia

3) Groundnut oil is obtained from seeds of _____.
a) Arachis hypogaea b) Glycine Max
c) Gossypium herbacem d) Cocas nucifera

4) Peanut oil belongs to _____.
a) Drying oil b) Semi-drying oils
c) Non-drying oils d) Vegetable oils

5) The botanical name of ginger is _____.
a) *Zingiber officinalis* b) *Tinospora cordifolia*
c) *Emblica officinalis* d) *Papaver somniferum*

6) Which part of the plant *Cinnamommum zeylanicum* is used in medicine _____.
a) Stem b) Carpel
c) Root d) Floral bud

7) Hevea barsiliensis is native of _____.
a) India b) West-Indies
c) Brazil d) Africa

8) _____ is the most important insecticidal chemical constituent obtained from Azadirachta inndica
a) Anabasine b) Pyrethrin
c) Azadirachtin d) Cinerin

9) The botanical name of ginger is _____.
a) *Zingiber officinale* b) *Papaver somniferum*
c) *Emblica officinalis* d) *Rauvolfia serpentine*

10) *Tinospora cordifolia* is _____.
a) a small tree b) a big tree
c) climbing shrub d) a small herb

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. **06**

1) Which is the most important insecticidal chemical constituent obtained from Neem?
2) Coir is obtained from which fruits?
3) Write down any one use of soybean oil.
4) Give the botanical name of any climber
5) What is the botanical name of cactus?
6) Groundnut oil is obtained from seeds of which plant? Give a botanical name.

Q.2 Solve any eight of the following. **16**

a) Write down the botanical name and source of red gram.
b) State any two economic importance of coir.
c) Write down the chief constituents of *Withania somnifera.*
d) State any two uses of Gulvel in indigenous system.
e) State any two properties of rubber.
f) Enlist the examples of plant dyes obtained from leaves and flowers.
g) Write down any two importance of Neem as a pesticide.
h) Write down the ornamental value of *Crossandra.*
i) Define plant perfumes and cosmetics.
j) Give the scientific name of clove and Ginger.

Q.3 A) Attempt any two of the following. **10**

1) Write the economic importance of Red gram.
2) Give the Medicinal use of *Emblica Officinalis.*
3) Give the economic importance of Palas.

B) Write the short notes on following questions. **06**

Write the Botanical name and uses of Lucerne.

Q.4 A) Attempt any two of the following. **08**

1) Write the note on Fodder legume *Sesbania.*
2) Write the economic importance of Coir.
3) Give botanical Name, Source and economic importance of Rose.

B) Answer the following. **08**

Give morphology of rubber plant and give an account of rubber extraction method

Q.5 Attempt any two of the following. **16**

a) Write the Source and Prosperities of Rubber plant with economic importance.
b) Give the account of cultural Practices of Soybean and economic importance.
c) Give botanical name, source and economic importance of Turmeric.

Seat No.	

Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Special Paper - XII)
Wildlife Conservation & Management (19201523)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple Choice Questions. **10**

1) Manipulation of wildlife populations or habitats to achieve desired goals by people is called as _____.
a) Manipulation strategies b) Wildlife Management
c) Life Management d) Approaches to Management

2) India belongs to _____ category in the context of wildlife and natural vegetation.
a) The richest wildlife zone in the world
b) The country with the largest forest cover
c) One of the twelve Mega biodiversity countries of the world
d) A country lacking in biodiversity cover

3) _____ are used for tiger census in national parks and sanctuaries.
a) Pug marks only b) Actual head counts
c) Faecal pellets only d) Pug marks and faecal pellets

4) Pellet-group counting is used for estimating the population density of various _____ species.
a) Carnivorous b) Ungulate
c) Thrips d) Insect

5) The most important human activity, leading to the extinction of wildlife, is _____.
a) Pollution of air and water
b) Hunting for valuable wildlife products
c) Introduction of alien species
d) Alteration and destruction of the natural habitats

6) _____ is used to understand animals and wildlife by remotely measuring physiology. behaviour and energetic status.
a) Geotelemetry b) Biometry
c) Geometry d) Biotelemetry

7) Highest population of Great Indian Bustard is found in _____ state in India.
a) Gujarat b) Maharashtra
c) Rajasthan d) Andhra Pradesh

8) _____ is the world's only floating national park.
- a) KeibulLamjao National Park
- b) Namdapha National Park
- c) Crater Lake National Park
- d) Dachigam National Park

9) Ecological restoration is the process of rebuilding a degraded ecosystem till _____.
- a) It becomes pollution free and provides solace to people
- b) It becomes free of disturbance
- c) Its structure and functions are restored
- d) It starts providing some ecosystem services

10) There are _____ Community Reserves in India.
- a) 218 b) 114
- c) 235 d) 135

B) Fill in the blank/Definition/One sentence answer/One word answer/ Give the name/Predict the product etc. **06**

1) The factor governing the structure of earth surface is _____ factor.
2) Preservation of viable material of endangered species can be done by _____.
3) CITES stands for _____.
4) Simpson's diversity index value range in between _____.
5) The ratio of males to females in a population is called as _____.
6) _____ is the First Tiger Reserve in India.

Q.2 Solve any Eight of the following. **16**

a) Pug marks
b) Climax persistence
c) Red data Book
d) Census Method
e) Setting back succession
f) Shannon diversity Index
g) Eco-tourism
h) Project Tiger
i) Positive value of biodiversity
j) Logging

Q.3 A) Attempt any Two of the following. **10**

1) Describe Methods of preservation of general genetic diversity.
2) Explain in brief Care of injured and diseased animal.
3) Explain in brief hair identification method of population estimation.

B) Write Short note on Causes of depletion of wildlife. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain in brief Conservation ethics.
2) Write short note on different ecological perturbances.
3) Explain physical parameters of habitat analysis.

B) Explain restoration of degraded habitat **08**

Q.5 Attempt any Two of the following. **16**

a) Write an account on the wildlife conservation strategies. Also mention the importance of conservation.

b) Give a detail account on wildlife protection act 1972. And mention its amendments.

c) Write an account on national parks in India with two examples.

Seat No.	

Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - XII)
Partial Differential Equations (19201527-A)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Select the correct alternative for each of the following. **10**

1) The equation $(2x+3y)p+4xq-8pq=x+y$ is _____ partial differential equation.
   a) Linear b) Non-linear
   c) Quasi-Linear d) Semi-linear

2) If the number of arbitrary constants are 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) more than one p.d.e. of order more than one

3) The order and degree of $\sqrt{\left(\frac{\partial^3 z}{\partial x^3}\right)^5+\left(\frac{\partial z}{\partial x}\right)^6}=\frac{\partial^4 z}{\partial x^2 \partial y^2}$ is _____ respectively.
   a) 3, 5 b) 4, 1
   c) 1, 6 d) 4, 2

4) The Lagrange's auxiliary equation for partial differential equation $Pp+Qq=R$ are _____.
   a) $\frac{dx}{P}=\frac{dy}{Q}=\frac{dz}{R}$ b) $\frac{dx}{p}=\frac{dy}{q}=\frac{dz}{R}$
   c) $\frac{\partial x}{P}=\frac{\partial y}{Q}=\frac{\partial z}{R}$ d) $\frac{dx}{P}=\frac{dy}{Q}$

5) The general solution of $zp=-x$ is _____.
   a) $x^2+y^2=\phi(z)$ b) $y^2+z^2=\phi(x)$
   c) $x^2+y^2=\phi(y)$ d) $x^2-y^2=\phi(z)$

6) One of the solution of $(y-zx)p+(x+yz)q=x^2+y^2$ is _____.
   a) $x^2+y^2+z^2=c_1$ b) $x^2-y^2+z^2=c_1$
   c) $x^2+y^2-z^2=c_1$ d) $x^2-y^2-z^2=c_1$

7) The standard form - III of non linear p.d.e. of order one is _____.
   a) $f(p,q)=0$ b) $f(p,q,z)=0$
   c) $f(p,q,x,z)=0$ d) $f(p,q,y,z)=0$

8) The singular integral of $z=px+qy+pq$ is _____.
   a) $z=ax+by+ab$ b) $z=xy$
   c) $z-xy=0$ d) $z=-xy$

9) The c.f. of $r + (a+b)s + abt = xy$ is _____.

a) $\phi_1(y+ax) + \phi_2(y+bx)$ b) $\phi_1(y-ax) + \phi_2(y-bx)$

c) $\phi_1(y+ax) + \phi_2(y-bx)$ d) $\phi_1(y-ax) + \phi_2(y+bx)$

10) The P.I. of $(D^2 - D'^2 + D - D')Z = e^{2x+3y}$ is _____.

a) $\frac{1}{3}e^{2x+3y}$ b) $\frac{1}{6}e^{2x+3y}$

c) $-\frac{1}{6}e^{2x+3y}$ d) $-\frac{1}{3}e^{2x+3y}$

B) Fill in the blanks. **06**

1) The first order Partial differential equation is known as _____ equation if it is linear in p and q.
2) Elimination of two arbitrary functions gives rise to partial differential equation of _____.
3) The first order Partial differential equations $p = P(x,y), q = Q(x,y)$ are compatible if and only if _____.
4) The equation $z = px + qy + F(p,q)$ is of the form _____.
5) When $f(x,y)$ is of the form x^m, y^n if $n < m$, should be expanded in power of _____.
6) The equation $\left(\frac{\partial^2 z}{\partial x^2}\right) - \left(\frac{\partial^3 z}{\partial y^3}\right) + \left(\frac{\partial z}{\partial x}\right) + z = x + y$ is _____ partial differential equation with _____.

Q.2 Solve any Eight of the following: **16**

a) Form a partial differential equation by eliminating arbitrary function from $z = f(x^2 - y^2)$

b) Form partial differential equation by eliminating arbitrary constant from the relation $z = axe^y + \frac{1}{2}x^2e^{2y} + b$

c) Explain the method of solving standard form - I of non-linear partial differential equation of order one.

d) Show that $p = 1 + e^{x/y}, q = 1 + e^{x/y}\left(1 - \frac{x}{y}\right)$ are compatible.

e) Find the complete integral of $q = 3p^2$

f) Find singular integral of $z = px + qy + \log(pq)$

g) Solve $\left(D^3 - 6D^2D' + 11DD'^2 - 6D'^3\right)z = 0$

h) Solve $\left(\frac{y^2z}{x}\right)p + xzq = y^2$

i) Find P.I. of $\left(D^2 - 2DD' - 15D'^2\right)z = 12xy$

j) Solve $r + 2s + t + 2p + 2q + z = 0$

Q.3 A) Attempt any Two of the following: **10**

1) Find the equation of surface satisfying $4yzp + q + 2y = 0$ and passing through $y^2 + z^2 = 1, x + z = 2$
2) Show that the equations $xp = yq$ and $z(xp + yq) = 2xy$ are compatible and solve them.
3) Solve $(D - D' - 1)(D - D' - 2)z = \sin(2x + 3y)$

B) Derive the partial differential equation by eliminating arbitrary function ϕ from the equation $\phi(u,v) = 0$ where u and v are functions of x, y, z. **06**

Q.4 A) Attempt any Two of the following: **08**

1) Explain the Lagrange's method of solving $Pp + Qq = R$ where P, Q, R are functions of x, y, z
2) Find complete and singular integrals of $4(1 + z^3) = 9z^4pq$
3) Solve $\left(D^2 - 6DD' + 9D'^2\right)z = \tan(y + 3x)$

B) Explain the method of finding complementary function of linear homogeneous partial differential equation with constant coefficient namely $f(D, D') = f(x, y)$ when the roots are distinct and hence find c.f. of $(2D^2 + 5DD' + 2D'^2)z = 0$ **08**

Q.5 Attempt any Two of the following. **16**

a) Explain Charpit's method of solving partial differential equation $f(x, y, z, p, q) = 0$ where x, y are independent variable and $p = \frac{\partial z}{\partial x}, q = \frac{\partial z}{\partial y}$ and hence solve $zpq = p + q$

b) For homogeneous linear partial differential equation with constant coefficient prove that $\frac{1}{(bD - aD')^n}\phi(ax + by) = \frac{x^n}{b^n n!}\phi(ax + by)$ and solve $\frac{\partial^2 v}{\partial x^2} + \frac{\partial^2 v}{\partial y^2} = 12(x + y)$

c) Solve

1) $s + p - q = z + xy$
2) $(D - D')(D + 2D')z = (y + 1)e^x$

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
Mathematics (Special Paper - XII)
Mathematical Analysis (19201527-B)

Day & Date: Wednesday, 06-12-2023 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 for each of the following. **10**

1) If $f(x) = \begin{cases} \frac{x^2-1}{x-1}, & x \neq 1 \\ 2, & x = 1 \end{cases}$ then _____.

a) $f(x)$ is continuous at $x = 1$
b) $f(x)$ is not continuous at $x = 1$
c) $f(x)$ has discontinuity of first kind
d) $f(x)$ has discontinuity of second kind

2) Which of the following is true?

a) The function $f(x) = \frac{1}{x}$ is uniformly continuous on (0,1]
b) The function $f(x) = \frac{1}{x}$ is not uniformly continuous on (0,1]
c) The function $f(x) = \frac{1}{x}$ is not continuous on (0,1]
d) All of these

3) If $f(x) = \frac{|x|}{x}$ then the right hand limit of $f(x)$ at $x = 0$ is _____.

a) 1 b) -1
c) 0 d) ∞

4) The value of 'C' in Rolle's theorem for the function $f(x) = x^2 - 4x + 3$ on [1,3] is _____.

a) $\frac{3}{2}$ b) 2
c) $\frac{5}{2}$ d) $\frac{3}{4}$

5) A function f is defined on $\mathbb{R}$ by $f(x) = \begin{cases} x & if \quad 0 \leq x < 1 \\ 1 & if \quad x \geq 1 \end{cases}$ then _____.

a) $f'(1)$ exist and equal to zero
b) $f'(1)$ exist and equal to one
c) $Lf'(1)$ and $Rf'(1)$ are not exist
d) $Lf'(1)$ and $Rf'(1)$ exist but are not equal

6) The value of 'C' in Lagrange's mean value theorem for the function $f(x) = x^3 - 4x^2 + 8x + 11$ when $x \in [0,1]$ is _____.

a) $\frac{\sqrt{7}-2}{3}$ b) $\frac{4-\sqrt{7}}{3}$

c) $\frac{2}{3}$ d) $\frac{4-\sqrt{5}}{3}$

7) At which condition Lagrange's mean value theorem become Rolle's theorem?

a) $c = 0$ b) $a = b$

c) $f(a) \neq f(b)$ d) $f(a) = f(b)$

8) Which of the following is false?

a) $\log_a\left(\frac{x}{y}\right) = \frac{\log_a x}{\log_a y}$ b) $\log_b^a \cdot \log_a^b = 1$

c) $\log_a x^y = y \cdot \log_a x$ d) $\log_a(x \cdot y) = \log_a^x + \log_b^y$

9) For the function $f(x) = 3x^2 - 2x^3$ for $-2 \leq x \leq 2$ $V(f, -2, 1) =$ _____.

a) 28 b) 29

c) 30 d) 31

10) The power series expansion of exponential function is _____.

a) $1 + \frac{x}{1!} + \frac{x^2}{2!} + \frac{x^3}{3!} + \cdots$

b) $1 + x + \frac{x^2}{2} + \frac{x^3}{3} + \cdots$

c) $1 + \frac{x^2}{2!} + \frac{x^4}{4!} + \frac{x^6}{6!} + \cdots$

d) $x + \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \cdots$

B) Fill in the blanks. **06**

1) The Dirichlet's function f on $\mathbb{R}$ is defined by _____.
2) A function f is said to have discontinuity of the first kind at $x = c$ if _____.
3) In Taylor's theorem, the Lagrange's form of reminder is _____.
4) A function f is strictly increasing in interval $[a, b]$ if _____.
5) The series $1 + x + x^2 + \cdots$ converges for _____ and equal to _____.
6) If $x = (x_1, x_2, x_3, \ldots . x_n)$ and $y = (y_1, y_2, y_3, \ldots . y_n)$ be two points in $\mathbb{R}^n$ then $\left|\sum_{i=1}^{n} x_i\, y_i\right| \leq \left(\sum_{i=1}^{n} x_i^2\right)^{\frac{1}{2}} . \left(\sum_{i=1}^{n} y_i^2\right)^{1/2}$

Q.2 Attempt any Eight of the following. **16**

a) Examine the continuity of $f(x) = \begin{cases} \frac{x^3-8}{x^2-4} & if\ x \neq 2 \\ 3 & if\ x = 2 \end{cases}$ at $x = 2$

b) Define left hand limit and right hand limit of function.

c) State intermediate value theorem.

d) Show that the function $f(x) = x^2$ is derivable on [0,1]

e) Prove that a function which is derivable at a point is continuous at that point.

f) State Cauchy's mean value theorem.

g) Find the expansion of $\cos x$ by Maclaurin's theorem.

h) Prove that $C(x_1 + x_2) = C(x_1) \cdot C(x_2) - S(x_1) \cdot S(x_2)$

i) Prove that $L(uv) = L(u) + L(v)$

j) Define the term function of bounded variation for vector valued function.

Q.3 A) Attempt any Two of the following. **10**

1) A function f is defined on $\mathbb{R}$ by

$$f(x) = \begin{cases} -x^2 & if \quad x \leq 0 \\ 5x - 4 & if \quad 0 < x \leq 1 \\ 4x^2 - 3x & if \quad 1 < x < 2 \\ 3x + 4 & if \quad x \geq 2 \end{cases}$$

then examine f for continuity at $x = 0,1,2$. Also discuss the kind of discontinuity, if any.

2) If f is derivable at 'c' and $f(c) \neq 0$ than prove that $\frac{1}{f}$ is also derivable at $'c'$ and $\left(\frac{1}{f}\right)'(c) = \frac{-f'(c)}{(f(c))^2}$

3) State and prove Jordan theorem.

B) If f and g are two functions defined on same neighbourhood of c such that $\lim_{x\to c} f(x) = \ell$ and $\lim_{x\to c} g(x) = m$ then prove that **06**

1) $\lim_{x\to c}[f(x) \cdot g(x)] = \ell.m$

2) If $m \neq 0$ then $\lim_{x\to c} \frac{f(x)}{g(x)} = \frac{\ell}{m}$

Q.4 A) Attempt any Two of the following. **08**

1) Prove that a function defined on an interval I is continuous at a point $C \in I$ iff for every sequence $\{c_n\}$ in I converging to c then $\lim_{x\to\infty} f(c_n) = f(c)$

2) A twice differentiable function f is such that $f(a) = f(b) = 0$ and $f(c) > 0$, for $a < c < b$ Prove that there is at least one value ξ between a and b for which $f''(\xi) < 0$

3) Prove that the product of two functions of bounded variation is also of bounded variation.

B) Prove that if f is of bounded variation on $[a, b]$, then it is also of bounded variation on $[a, c]$ and $[c, b]$ where c is a point of $[a, b]$ and conversely. Also $V(f, a, b) = V(f, a, c) + V(f, c, b)$ **08**

Q.5 Attempt any Two of the following. **16**

a) Prove that if a function is continuous on closed interval $[a, b]$ then it is also bounded and also prove that it attains its bound at least once in $[a, b]$

b) State and prove Taylor's theorem.

c) Compute the positive, negative and the total variation functions of f, where $f(x) = [x] - x \quad (0 \leq x \leq 2)$

SLR-DA-208

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper – XII)
Operations Research (19201531)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 6:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple Choice questions. **10**

1) The mathematical model of an LP problem is important because
a) It helps in converting the verbal description and numerical data into mathematical expression
b) decision-makers prefer to work with formal models
c) it captures there level and relationship among decision factors
d) it enables the use of algebraic technique

2) Linear programming is a _____.
a) Constrained optimization technique
b) Technique for economical location of limited resources
c) Mathematical technique
d) All of the above

3) If one of the constraint of an equation in an LP problem has an unbounded solution, then
a) Solution to such LP problem must be degenerate
b) Feasible region should have a line segment
c) Alternative solutions exist
d) none of the above

4) The solution to a transportation problem with m-rows (supplies)and n-columns(destination) is feasible if number of positive allocations are
a) $m+n$ b) $\mathrm{m} \times \mathrm{n}$
c) $m+n-1$ d) $m+n+1$

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) The difference between the expected profit under conditions of risk and the expected profit with perfect information is called _____.
a) expected value of perfect information
b) expected margin all loss
c) expected opportunity loss
d) none of the above

8) A feasible solution to an LP problem _____.
- a) Must satisfy all of the problem's constraints simultaneously
- b) Need not satisfy all of the constraints, only some of them
- c) Must be a corner point of the feasible region
- d) Must optimize the value of the objective function

9) Monte Carlo is _____.
- a) a technique for modeling
- b) a book
- c) a technique for Simulation
- d) none of these

10) A type of decision Making Environment is _____.
- a) Certainty
- b) Uncertainty
- c) Risk
- d) All of these

B) Fill in the Blanks. **06**

1) Convert $\geq$ type constraints into equality type by adding _____ variables.

2) A given Transportation problem is said to be _____ if the total supply is not equal to the total demand.

3) In graphical method of solving a LPP, the bounded region is known as _____ region.

4) The difference between the expected profit under conditions of risk and the expected profit with perfect information is called _____.

5) To calculate penalty for each row and each column by taking the difference between the _____ unit costs, in VAM.

6) Monte Carlo is technique for _____.

Q.2 Solve any Eight of the following. (Two marks each) **16**

a) Define Solution of LPP
b) Define an Artificial Variable.
c) Write the mathematical Model of transportation Problem.
d) Define Assignment Problem.
e) Define Total elapsed time in Sequencing Problem?
f) What is Sequencing Problem?
g) Give a standard form of LPP.
h) Define Dummy activity.
i) What is an opportunity loss in decision making Problem?
j) What is an unbalanced Assignment Problem?

Q.3 A) Attempt any Two of the following. **10**

1) A departmental head has four tasks to be performed and three subordinates differ in efficiency. The estimate of the time subordinates would take to perform is given below in the matrix. Allocate the task one to each man so as to minimize the total man hour.

Task/Men	1	2	3
1	9	26	15
2	13	27	6
3	35	20	15
4	18	30	20

2) Explain EVPI in decision making.

3) Write the procedure of processing n jobs on two machines.

B) Write the steps involved in the Procedure of Monte Carlo Simulation. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Give the steps involved in Minimax regret criterion.
2) Write the dual of following LPP:

Minimize $Z = x1 - 3x2 + 2x3$

Subject to the constraints,

$$3x1 + x2 + 2\,x3 \leq 7$$
$$-2x1 + 4x2 \leq 12$$
$$-4x1 + 3x2 + 8\,x3 \leq 10$$
$$x1,\ x2, x3\ \geq 0$$

3) Explain the procedure of generating random number from Bernoulli distribution.

B) Solve Following LPP **08**

Maximize $Z = x1\ + 2x2\ + 3x3$

Subject to the constraints,

$$x1 + 2x2\ + 3x3 \leq 10$$
$$x1\ + x2 \leq 5$$
$$x1 \leq 1$$
$$x1, x2, x3 \geq 0$$

Q.5 Attempt any Two of the following. **16**

a) Find the Initial Basic Feasible Solution to the following Transportation problem by using VAM method,

		Destination				
		D_1	D_2	D_3	D_4	**Supply**
Source	S_1	21	16	15	3	11
	S_2	17	18	14	23	13
	S_3	32	27	18	41	19
	Demand	6	10	12	15	

b) Determine the optimal sequence of jobs that minimize the total elapsed time based on following information. Processing time on machine is given in hours and passing is not allowed.

Job	**A**	**B**	**C**	**D**	**E**	**F**	**G**
Machine A	3	8	7	4	9	8	7
Machine B	4	3	2	5	1	4	3
Machine C	6	7	5	11	5	6	12

c) The probabilities of three states of nature are 0.1,0.7, 0.2 respectively. Calculate EMV, EOL and EVPI.

States of Nature	**Acts**		
	A_1	**A_2**	**A_3**
E_1	25	-10	-125
E_2	400	440	400
E_3	650	740	750

SLR-DA-209

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - XII)
Regression Analysis (19201532)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 6:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternative. **10**

1) The sum of residuals in any regression model that contains an intercept is always _____.
a) zero b) one
c) non-zero d) positive

2) In simple linear regression model $Y = \beta_0 + \beta_1 X + \varepsilon,\ X$ and Y are respectively _____.
a) response variable and regressor variable
b) response variable and predictor variable
c) slope and intercept
d) None of These

3) The sum of residuals weighted by the corresponding value of the regressor is always equal to _____.
a) 0.5 b) 0
c) 1 d) -1

4) If all observations on response variable Y are located on a straight line, then _____.
a) SST = SSR b) SSR = SS_{res}
c) SST = SS_{res} d) SST = SSR = SS_{res}

5) In logistic regression model, errors follow _____.
a) Normal distribution b) Binomial distribution
c) Poisson distribution d) Uniform distribution

6) In univariate logistic regression model, estimate of odds ratio is given by _____.
a) $\text{In}\ \beta_1$ b) $\frac{1}{\beta 1}$
c) $\sqrt{\beta 1}$ d) $e^{\beta 1}$

7) Hat matrix is given by _____.
a) $X(X'X)^{-1}$ b) $X'(X'X)^{-1}$
c) $X'(X'X)^{-1}X$ d) $X(X'X)^{-1}X'$

8) Backward elimination process begins with the assumption that _____.
- a) no regressors are in the model
- b) some regressors are in the model
- c) all regressors are in the model
- d) None of These

9) Value of adjusted R^2 always lies between _____.
- a) 0 and 1
- b) -1 and 1
- c) 0 and ∞
- d) $-\infty$ and ∞

10) Which of the following is a criterion for evaluating a regression model?
- a) large value of MS_{res}
- b) Partial F statistic
- c) Mallow's C_p statistic
- d) VIF

B) Fill in the blanks. **06**

1) In the regression equation, $Y = 10 + 5X + \varepsilon$, the slope is _____.

2) In simple linear model, to test hypothesis about intercept parameter _____ test is used.

3) The transformation ln $(\frac{\prod(x)}{1-\prod(x)})$ is called _____.

4) In multiple linear regression model, variance of least square estimator of β is _____.

5) In simple linear regression model, the distribution of error term is assumed to be _____.

6) The sum of the residuals weighted by the corresponding fitted value is always equal to _____.

Q.2 Solve any Eight of the following. **16**

a) State the assumptions of error term in simple linear regression model.
b) Define the matrix H. state Properties of H.
c) Define coefficient of determination R^2.
d) Explain the term variable selection in linear regression
e) Obtain the confidence interval for β_1.
f) With usual notations, show that $\mathrm{Cov}\,(I - H) = 0$
g) Write simple linear regression model.
h) Define dichotomous independent variable with illustration.
i) With usual notations, show that $(1 - H)\,X = 0$
j) Discuss the logit transformation in the context of logistic regression model.

Q.3 A) Attempt any Two of the following. **10**

1) Define residual vector in regression analysis. Obtain its mean and Variance.
2) What is logistic regression model? Give a real-life situation when this model is Appropriate.
3) Define the ANOVA approach to test the significance of regression in a simple regression model

B) Explain the residual plot. Outline the procedure of construction of normal probability plot **06**

Q.4 A) Attempt any Two of the following. **08**

1) Describe forward selection method for variable selection and state its limitations.
2) Describe the Pearson's chi - square test for goodness of fit of a logistic model.
3) In multiple regression model $Y = X\beta + \varepsilon$ show that $\beta = \beta + (X'X)^{-1}X'\varepsilon$

B) In usual notations, prove that. **08**

i) $Var(\hat{Y}) = \sigma^2 H$

ii) $Var(\hat{\beta}) = (X'X)^{-1}\sigma^2$

Q.5 Attempt any Two of the following. **16**

a) Describe a multiple linear regression model. Stating the assumptions, obtain the mean and variance of least square estimator $(\mathrm{LSE})\hat{\beta}\ of\ \beta$

b) Derive the maximum likelihood estimators of parameters of logistic regression model with covariate.

c) Explain the concept of simple linear regression with illustration. Derive least squares estimators of the regression coefficients in the model.

SLR-DA-210

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper - XII)
Applied Geology – Prospecting and Mining Geology (19201537)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) Bouger anomaly correction is carried out to detect _____ survey.
   a) Seismic b) Magnetic
   c) Electrical d) Gravity

2) Quarries are generally _____.
   a) open pits b) surface coal mines
   c) underground mines d) explosive mines

3) 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

4) In the _____ configuration, the current and potential electrode pairs have a common mid point and the distance between adjacent electrodes are equal.
   a) Double dipole b) Schlumberger
   c) Wenner d) pole – pole

5) Drift mining is generally employed:
   a) For the underground mining
   b) For coal mining
   c) In the exploitation of placers
   d) In the exploitation of copper ore

6) _____ 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

7) Prospecting based on geological maps with scale of 1:50,000 is called _____ survey.
   a) Reconnaissance b) Preliminary
   c) Detailed d) None of the above

8) A criteria covers the geological settings associated primarily with the age of various sedimentary series (or intrusions) enclosing a mineral.
   a) Stratigraphic criteria b) Geomorphological criteria
   c) Structural criteria d) None of the above

9) 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

10) What is the name of solid waste that was produced during mining?
   a) Tailing b) Rocks
   c) Minerals d) Deposits

B) Fill in the blanks: **06**

1) Which type of mining would most likely be used if a resource is concentrated in deep pockets in ground that is safe for tunnelling?
2) Self potential method is the most suitable method for prospecting of _____.
3) Major Gold resources in India is located at _____ gold fields.
4) The amount of a particular element present in the parent rock not affected by dispersion or migration is known as _____.
5) The method used for detailed exploration of oil and gas?
6) The openings in the mine, which serve as a means of entry is known as:

Q.2 Solve any Eight of the following. **16**

a) Name any two correction data of magnetic survey.
b) In Prospecting which geophysical methods is based on the typical properties exhibited by rock formations?
c) Which of the following are major environmental issues involved in mining?
d) Name two types of dispersion halos in geochemical exploration.
e) Define the term Geiod.
f) Which of the following criteria is used for coal deposits?
g) Define the term prospecting.
h) Name the types of electrical configuration methods.
i) Give two examples of Climatic criteria.
j) Name any two elementary parts of mine

Q.3 A) Attempt any Two of the following. **10**

1) Write the note on difference between Werner and Schlumberger electrical method.
2) Explain the five types of sampling methods.
3) Discuss the brief the field procedure of seismic method with neat labelled diagram.

B) Write a short note of self potential electrical method. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Describe in detail the applications of magnetic method.
2) Write a note on geochemical dispersion halos.
3) Explain vertical electrical sounding.

B) Define mining. Describe the types of mining. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain the environmental impact of mining.
b) Discuss in brief the instrumentation, field procedure, data interpretation and applications of Gravity method.
c) Describe in detail the different geological criteria used for Iron ore deposit.

SLR-DA-211

Seat No.		Set	P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - XII)
Industrial Microbiology (19201542)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 6:00 PM

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) Which of the following food has lowest aw value?
a) fresh fruits b) Milk
c) Bread d) dry fruit

2) Generally Bacteria prefer _____ pH
a) Acidic b) Basic
c) Neutral d) None of the above

3) _____ Organic acid is used as food preservative
a) Sulfuric b) Boric
c) Nitric d) Sorbic

4) The Yoghurt is made from
a) Lactobacillus bulgaricus b) Streptococcus cremoris
c) both a and b d) None of the above

5) Pasteurization is a process that heats milk
a) above boiling point b) below boiling point
c) above 150°C d) below 50°C

6) Streptomycin acts on _____.
a) protein synthesis b) cell wall
c) cell membrane d) Nucleic acids

7) L lysine is an_____.
a) amino acid b) vitamin
c) antibiotic d) protein

8) What type of yeast are used in ale beer fermentation?
a) top fermenting b) bottom fermenting
c) middle fermenting d) non fermenting

9) In _____ chromatography separation of molecules is based on Size, Shape and molecular weight?
a) Ion exchange b) Gel filtration
c) Adsorption d) Affinity

10) _____ is the most commonly used salt for precipitation of biological molecules.
a) KCl b) NaCl
c) $(NH_4)_2SO_4$ d) NH_4Cl

B) Answer the following questions in one or two words **06**

1) Name of the organism used in streptomycin fermentation
2) Name of the organism used in lager beer fermentation
3) Name of the organism used in Bread making
4) Name the process that allows separation of large solids from liquid
5) Name of the process that allows separation of volatile compounds on the basis of differences their boiling points
6) Test for pyrogenicity of compounds is also called as _____.

Q.2 Solve any eight of the following. **16**

a) What is Malt?
b) What are hops?
c) Give examples of sparkling wines
d) Enlist solvents used in solvent extraction
e) What is must?
f) What is sherry?
g) What is flocculation?
h) What are the symptoms of clostridial food poisoning?
i) Enlist types of cheeses
j) What are the advantage of insulin manufactured as r-DNA product?

Q.3 A) Attempt any two of the following. **10**

1) L- lysine fermentation
2) What are the factors affecting antigenicity?
3) Discuss in detail spoilage of meat and meat products.

B) Discuss Principles of preservation of food. **06**

Q.4 A) Attempt any two of the following. **08**

1) How can precipitation be used for downstream processing?
2) Discuss the process of Cheddar cheese making.
3) Discuss harvest and recovery of vitamin B12 from fermented broth

B) Discuss non microbial spoilage of wine. **08**

Q.5 Attempt any two of the following. **16**

a) Elaborate Red wine fermentation
b) Explain Chromatography as a separation technique with types.
c) Discuss streptomycin fermentation.

SLR-DA-213

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Special Paper - XII)
Electronics Communication (19201552)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 6:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) _____ communication is simplex communication system.
a) satellite b) telephone
c) mobile d) Television

2) In frequency modulation power is _____ in each side band.
a) equally distributed b) un equally distributed
c) 1/6 d) 4/3

3) ionospheric propagation is due to _____ wave.
a) ground b) sky
c) surface d) tropospheric

4) The vestigial side band width of TV signal for 625-line scanning is ____.
a) 4.5MHz b) 5.5 MHz
c) 10 MHz d) 7 MHz

5) In telephone communication when cradle is ON hook, _____ circuit is disconnected.
a) Amplifier b) hybrid
c) speech d) ringer

6) Signal to noise ratio is _____.
a) signal power/noise power b) noise power/signal power
c) Vp input/Vp output d) Np output/Np input

7) _____ is an example of balanced modulator.
a) ring modulator b) frequency modulator
c) phase modulator d) all of these

8) _____ antenna is used in satellite communication.
a) Rhombic b) Yagi
c) oodi d) parabolic

9) IF of AM receiver is _____.
a) 10.7 MHz b) 455 MHz
c) 10.7 KHz d) 455 KHz

10) _____ dialler is used In modern telephone handset.
a) DTMF b) RTMF
c) STMF d) pulsed

B) Answer in one sentence. **06**

1) Define Electronic communication.
2) Define modulation index in F.M. Give its formulae.
3) What are the types of antenna?
4) Draw general block diagram of communication system.
5) What is the role of blanking and synch signal?
6) Define noise. List its types.

Q.2 Solve any Eight of the following. **16**

a) In electronic communication system signal power is 2 watt and noise power is 4 watt calculate signal to noise power in percentage.
b) Define virtual height.
c) What is modulation? What are its types?
d) What is radio receiver? What are its types?
e) List different tones used in telephone communication
f) What are the types of electronic communication system?
g) Define demodulation, where it is used?
h) What is radio wave propagation? What are its types?
i) What is audio and video signal?
j) Define telephone communication?

Q.3 A) Attempt any Two of the following. **10**

1) Explain concept of DSB and SSB.
2) Explain any five receiver characteristics of Radio receiver.
3) Explain tropospheric wave radio propagation.

B) Explain envelope detector. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain FM super heterodyne receiver with necessary block diagram.
2) Explain DTMF dialing system used in telephone communication.
3) Explain simplex and duplex communication system.

B) Explain Monochrome TV receiver with necessary block diagram. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain Horizontal and Vertical timing standards used in TV scanning.
b) Explain Dish antenna in detail.
c) Explain Frequency modulation with derivation of output voltage of FM modulated wave.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Special Paper – XII)
Python (19201546)

Day & Date: Wednesday, 06-12-2023 Max. Marks: 80
Time: 03:00 PM To 6:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) _____ is mutable type.
a) String b) Int
c) Double d) Dictionary

2) The _____ is the first parameter for every instance method.
a) cls b) inst
c) self d) init

3) The _____ method is used to add new attribute in class.
a) setattr() b) addattr()
c) creatattr() d) insertattr()

4) What is the output of the following code?
list(range(10))
a) [0,1,2,3,4,5,6,7,8,9,10] b) [1,2,3,4,5,6,7,8,9,10]
c) [1,2,3,4,5,6,7,8,9] d) [0,1,2,3,4,5,6,7,8,9]

5) The _____ method change current file position.
a) change() b) tell()
c) seek() d) modify()

6) The _____ character is used to represent digits.
a) /d b) /D
c) /wd d) /WD

7) A _____ type of member is preceded by a double underscore (__)
a) Private b) Public
c) Protected d) Constant

8) _____ statement is not possible about set $s = \{10,20,30,40\}$
a) len(s) b) sum(s)
c) max(s) d) print (s[3])

9) The sorted method of tuple return sorted values in the form of _____ type.
a) List b) Tuple
c) Set d) Frozen set

10) Python supports the creation of anonymous functions at runtime, using _____ construct.
a) map b) filter
c) lambda d) pi

B) Fill in the blanks. **06**

1) In _____ string formatting method, you just mention the identifiers in curly braces.
2) The _____ statement allows the programmer to force a specified exception to occur.
3) The _____ method is used to find identification number of an object.
4) The _____ method is used to add single element in list.
5) The _____ method removes whitespaces from the beginning and end of the string.
6) To use keyword base variable length arguments, _____ star are used.

Q.2 Solve any Eight of the following. **16**

a) How to create static methods? Give example.
b) What is the use of the sub() method in the RE module?
c) How to create a constructor? Give example.
d) What are different methods to remove elements from the dictionary?
e) What is a python virtual machine?
f) Give any four type conversion function in python.
g) How to install the module? Give example.
h) How to validate email? Give example.
i) What is the use of a pass statement? Give example.
j) What are Global and Local variables? Give example.

Q.3 A) Attempt any Two of the following. **10**

1) What is the purpose of MRO? Explain MRO with an example.
2) What is the difference between List and tuple? Explain any three methods of list and tuple with an example.
3) What are different methods to read the file? Write a program to create and read the binary file.

B) Write a python script to overload any three comparison operators. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain Identity and membership operator with example.
2) What is the difference between function and module? Explain how to create an anonymous function with an example.
3) Explain instance method and class methods with example.

B) How to create an abstract class and interface? Write an example of Interface and Abstract class. **08**

Q.5 Attempt any Two of the following. **16**

a) How to handle exceptions? Explain any six built-in exceptions with example.
b) Why super() is used? Explain in detail super() with example.
c) What is the Module? How to import the module? Explain any four functions of random and date time module.

Seat No.	

Set **P**

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
Certificate Course in Testing and Repairs of Electric Appliances
(Special Paper - XI) (19201515)

Day & Date: Thursday, 07-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculator is allowed.

Q.1 A) Choose correct alternatives. **10**

1) Which of these is a conductor?
   a) Rubber b) Mica
   c) Copper d) Wood

2) A device that breaks the circuit is called _____.
   a) Filament b) Switch
   c) Bulb d) Battery

3) Which of the following is not a part of the earthing system?
   a) Earthing lead b) Earth Continuity Conductor
   c) Earth Electrode d) Fuse

4) Two resistances of 200 and 400 ohm are connected in series. The equivalent resistance of the series combination of these two resistances will be _____ohm.
   a) 200 b) 400
   c) 300 d) 600

5) The heating element in a toaster is made of _____wire.
   a) Kanthal b) Nickel
   c) Nichrome d) Cupranickel

6) What is thermostat complex of the geyser?
   a) 0 °C to 80 °C b) 20 °C to 80 °C
   c) 32°C to 88 °C d) 32°C to 100 °C

7) Magnetic field exists around _____.
   a) Germanium b) Copper
   c) Gold d) Moving charges

8) Which of the following is not a permanent magnet?
   a) Iron b) Cobalt
   c) Nickel d) Soft iron

9) The material present inside the bulb that glows on heating is called _____.
   a) Cell b) Switch
   c) Filament d) Thick wire

10) The thin wire that gives off light is called _____.
   a) Bulb b) Filament
   c) Cell d) Circuit

B) Fill in the blanks/ Definition/ One sentence answer/ One-word answer/ Give the name/ predict the product etc. **06**

1) An electric bulb marked 100 watt-230 volts is connected across 230-volt power line for 10 hours daily. The number of days required to consume 10 unit of electricity will be _____.
2) Two resistances of $100\ \Omega$ resistance each are connected in parallel. Calculate their equivalent resistance.
3) Capacity of a condenser is measured in _____.
4) Nichrome is alloy of nickel and _____.
5) For frequent line voltage failure, in domestic use, _____ lamp is used.
6) Which gas among Hydrogen (H_2), Carbon dioxide (CO_2), Argon (Ar) and Methane (CH_4) is sometimes used in filament lamps?

Q.2 Solve any Eight of the following. **16**

a) How a fuse wire works?
b) What is earthing?
c) Explain how to calculate the equivalent resistance of resistors connected in series.
d) What are different effects of electric currents?
e) What is a magnet?
f) Discuss magnetic effect of electric current.
g) Discuss points of difference between a ceiling fan and table fan.
h) How a tungsten filament works?
i) Write different parts of sodium vapor lamp.
j) What is a capacitor?

Q.3 A) Attempt any Two of the following. **10**

1) Write a note on electrical Conductors.
2) With neat diagram explain working of ceiling fan.
3) Draw neat diagram of tube light and its circuit.

B) Discuss different parts of air cooler. **06**

Q.4 A) Attempt any two of the following. **08**

1) Discuss different types of wires.
2) With neat diagram explain working of table fan.
3) Discuss different parts of mixer.

B) Write a note on electric circuit and ohm's law. **08**

Q.5 Attempt any two of the following. **16**

a) What is a fuse wire? What are its uses?
b) Draw neat diagram of a toaster and explain its working.
c) Draw neat diagrams of hair dryer and explain its principle of working.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
Thin Film Deposition and Characterization Techniques
(Special Paper XI) (19201516)

Day & Date: Thursday, 07-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Neat labelled diagrams must be drawn wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculator is allowed.

Q.1 A) Multiple choice questions. **10**

1) In ultraviolet-visible light (UV-vis) spectroscopic, light absorption is measured as a function of _____.
   a) Velocity b) Frequency
   c) Motion d) Wavelength

2) In order to obtain thin films with good quality, there are _____ common deposition techniques.
   a) 1 b) 2
   c) 3 d) 4

3) The deposition of conductor films for contact formation and inter connections can be accomplished by generally _____ technique.
   a) Sputtering b) CBD
   c) Sol-gel d) SILAR

4) _____ technology is used to get cheap resistor and capacitors.
   a) Thick film b) Thin film
   c) Both a) and b) d) None of the above

5) The first talk about nanotechnology was give by _____.
   a) Einstein b) Newton
   c) Planck d) Feynman

6) In most materials the growth of amorphous films takes place at _____ substrate temperatures.
   a) Absolute zero b) Low
   c) High d) Intermediate

7) _____ formula is used to determine crystallite size of the material.
   a) Newton's b) Mass-energy
   c) Scherrer's d) Planck's

8) UV Vis spectroscopy is used to determine _____ of the material.
   a) Energy states b) Optical band gap
   c) Frequency d) Momentum

9) The absorption coefficient generally _____ with increasing photon energy.
   a) Decreases b) Increases
   c) Constant d) Zero

10) Spray pyrolysis deposition method is used for _____.
   a) Generating electricity b) Coating the film
   c) Cooling systems d) Welding methods

B) Fill in the blank/Definition/ One sentence answer/One word answer/ Give the name/Predict the product etc. **06**

1) _____ approach involves the breaking down of the bulk material into nanosized structures or particles.
2) Name one technique used for characterizing the thickness of thin film?
3) What is the full form of JCPDS?
4) Modified chemical bath deposition method is also known as _____.
5) _____ characterization technique can be used to observed the surface fracture of material.
6) The substrates are generally boiled in concentrated _____ acid.

Q.2 Attempt the following (Any Eight) **16**

a) How is the water contact measured?
b) What do you mean by backscattered electrons in SEM?
c) How dose humidity affect substrate cleaning?
d) How is the gel formed in the sol-gel method?
e) What are the limitations of CBD method?
f) What are the steps involved in SILAR method?
g) What is electrical resistivity?
h) What is ultrasonic cleaning, and how does it work?
i) What are some key properties of thin films?
j) State the techniques for characterizing thin films?

Q.3 A) Attempt the following (Any Two) **10**

1) Discuss the advantages and disadvantages of physical and chemical methods for thin film preparation.
2) What are top-down and bottom-up approaches for thin film preparation? Write one example of each.
3) Write a short note on substrate cleaning equipments and techniques.

B) A ray of light travels from air with a refractive index of 1.00 into a medium with a refractive index of 1.50. Calculate the angle of refraction if the angle of incidence is 30 degrees. **06**

Q.4 A) Attempt the following (Any Two) **08**

1) Write a short note role of thin film in various sectors.
2) The sample has a length of 10 centimetres and a diameter of 2 millimetres. The measured resistance is 100 ohms. Calculate the electrical resistivity of the material.
3) Describe in brief water contact angle.

B) A crystalline sample of silver metal is subjected to X-ray diffraction analysis. The X-ray used has a wavelength of 0.154 nm, and the first-order diffraction peak is observed at an angle of 38.2 degrees. Calculate the interplanar spacing (d-spacing) in the crystal lattice. **08**

Q.5 Attempt the following (Any Two) **16**

a) Describe the Chemical Bath Deposition (CBD) method, including its principle, parameters and applications.
b) Draw the neat labelled diagram of SPD and explain it.
c) Describe construction and working of X-ray diffraction method to determine crystal structure.

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Seat No.	

Set P

B.Sc. (Semester – V) (New) (CBCS) Examination: Oct/Nov-2023
Scientific Research Substrate Cleaning Paper Writing and Publications
(Special Paper - XI) (19201517)

Day & Date: Thursday, 07-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) The intersection of a column and a row in MS-Excel worksheet is known as _____.
   a) Row b) Column
   c) Tab d) Cell

2) JRF stands for _____.
   a) Junior Research Functions
   b) Junior Research Fellowship
   c) Junior Fellowship
   d) None of the above

3) Origin graph _____ after copying it in MS word file.
   a) Not possible to copy from Origin
   b) Cannot modified
   c) Can be modified
   d) None of these

4) Population Census is an example of _____ Research.
   a) Survey b) Empirical
   c) Clinical d) Diagnostic

5) Ethical Neutrality is a feature of _____.
   a) Deduction b) Scientific method
   c) Observation d) Experience

6) Using Origin one can plot _____.
   a) Multilayered graph b) Multicolored graph
   c) Both A and B d) None of the above

7) In MS Excel, the content of the cell is shown in _____.
   a) Name box b) Formula bar
   c) Both of the above d) None of the above

8) Columns in Origin can be added with _____ shortcut key.
   a) Ctrl+D b) Ctrl+A
   c) Ctrl+V d) Ctrl+C

9) Peer reviewers provides _____ to the authors to improve quality of their research paper.
   a) data b) results
   c) editor information d) suggestions

10) Graph maker in Origin software allows to _____ for graph customization.
   a) Drag and drop b) Double click
   c) Single click d) None of the above

B) Fill in the blank/ Definition/One sentence answer/One word answer/Give the name/Predict the product etc. **06**

1) _____ is “systematically conceptual structure of inter related elements in some schematic form”.
2) Formulas in Excel start with _____.
3) Good Research is always _____.
4) _____ is a quality of Good Researcher.
5) _____ is a free lightweight version of MS Excel available as part of Office on the web.
6) The modification of legends of the graphs in Origin software, can be done by _____ on the graph.

Q.2 Solve any Eight of the following. **16**

a) What is scientific writing?
b) What is the important part of scientific reports? Why?
c) Name any four UGC indexed journals.
d) Name two software’s for plotting graph.
e) Expand UGC and CARE in UGC care list journals.
f) What is the advantage of origin over MS Excel?
g) In which software do you prepare presentations? What are slides in presentation?
h) What is impact factor of journals?
i) What is literature review in research methodology?
j) Write the publication process of journals.

Q.3 A) Attempt any Two of the following. **10**

1) List the content of research paper and briefly explain each part.
2) Explain the procedure for literature review in research methodology.
3) Write scientific report on effect of COVID-19 on human health.

B) A technical report is prepared using MS-word. Explain how to add an equation, table, pictures in the report. Write necessary steps. **06**

Q.4 A) Attempt any Two of the following. **08**

1) What is the first step to start research? Explain how one can publish the research article in any journal?
2) What is a report? Prepare a report to motivate the degree holders for self-employability.
3) Write a technical report on mobile communication.

B) What is peer review in research publication? Write the detailed steps for it. **08**

Q.5 Attempt any Two of the following. **16**

a) Plot the graph of students result analysis in 1^{st} class, 2^{nd} class, Distinction etc. (Consider 14 students in the class).
b) Prepare a power point presentation of ten slides to present an effect of deficiency of calcium and iron in women. Specifically describe the preparation of the first and last slide of the presentation in detail.
c) What is a research paper/article? What is the structure of the research paper? Explain each section.

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov - 2023
Medical Physics (Special Paper - XI) (19201518)

Day & Date: Thursday, 07-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) Q. No. 1 and 2 are compulsory.
2) Attempt any three questions from Q.No.3 to Q.No.7
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternative. **10**

1) Who developed an Electrocardiogram?
   a) Wilhelm His b) Steward
   c) Hubert Mann d) Willem Einthoven

2) In a normal X-Ray machine, X-ray are produced by _____.
   a) bombardment of cathode rays on a radioactive material
   b) nuclear fission
   c) nuclear fusion
   d) super heating of an element

3) 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

4) Counting the number of QRS complexes, which of the following can be interpreted?
   a) Rate of heartbeat b) Rate of breathing
   c) Cardiac output d) Stroke volume

5) Which two number form the binary number system?
   a) 0 and 2 b) 1 and 2
   c) 0 and 1 d) 1 and 3

6) In a single circulation the Heart Pumps?
   a) Oxygenated blood b) Deoxygenated blood
   c) Mixed blood d) Only blood nutrients

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) In the case of a normal Heartbeat, Depolarization stimulus arises in which of the following?
   a) Epicardium
   b) Sinoatrial Node (SA node)
   c) Atrioventricular Node (AV node)
   d) His bundle

9) Who developed an Electrocardiogram?
   a) Wilhelm His b) Steward
   c) Hubert Mann d) Willem Einthoven

10) What is the difference between soft and hard X-rays.
   a) Velocity b) Intensity
   c) Frequency d) Polarization

B) Fill in the blanks/ Definition/ One sentence answer/ One-word answer/ Give the name/ predict the product/ Write true/ false. **06**

1) For which of these areas can the ultrasound be taken for an infant but not for an adult?
2) What does MRI Stand for?
3) Optic fibers are used in endoscopy.
   a) True b) False
4) T_1 increase with magnetic field.
   a) True b) False
5) Dental X-Ray is also known as _____.
6) Flame emission detector is a type of radiation detector.
   a) True
   b) False

Q.2 Answer the following. **16**

a) Describe ultrasonic waves from piezoelectric materials.
b) What do you mean by medical diagnostic and therapeutic radiation?
c) What are the advantages of PET and X-Ray?
d) Discuss visible and IR radiations.

Q.3 Answer the following. **16**

a) Explain the application of Laser in medical field.
b) Describe the x-ray tube and its working with the help of diagram.

Q.4 Answer the following. **16**

a) Write short note on Generations of computer.
b) Write short notes on contact CT Scan.

Q.5 Answer the following. **16**

a) Describe about GM tube and its working with the help of diagram.
b) Explain the five type of lumineense.

Q.6 Answer the following. **16**

a) What are the type of optical radiation? Explain any one of them.
b) Describe the functions of Electrocardiogram.

Q.7 Answer the following. **16**

a) Describe sonography and its working.
b) Explain the term electromagnetic wave and Doppler Shift.

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Seat No.	

Set P

B.Sc. (Semester - V) (New)(CBCS) Examination: Oct/Nov-2023
Energy Resources (Special Paper - XI) (19201519)

Day & Date: Thursday, 07-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) A Solar cell is an electrical device that converts the energy of light directly into electricity by which effect _____.
   a) Physical effect b) Chemical effect
   c) Photovoltaic effect d) Photosynthesis effect

2) The main composition of biogas is _____.
   a) Hydrogen b) Methane
   c) Nitrogen d) Carbon dioxide

3) Conventional energy sources may also called as _____.
   a) Commercial energy sources
   b) Non renewable energy sources
   c) Both
   d) None

4) Coal produces _____ which is the cause of acid rain.
   a) Carbon mono-oxide b) Carbon dioxide
   c) Sulphar dioxide d) None of these

5) Natural gas is mainly composed of _____.
   a) Carbon and hydrocarbons
   b) Methane with small amount of propane and ethane
   c) Nitrogen
   d) Hydrogen

6) Solar energy can be used as _____.
   a) By direct conversion to a fuel by photosynthesis
   b) By conversion to electricity via thermo-electric power system
   c) By direct conversion to electricity by photovoltaic
   d) All of these

7) Which energy is developed by the gravitational pull of the sun and the moon _____
   a) Wind energy b) Tidal energy
   c) Geothermal energy d) Solar energy

8) Full form of OTEC.
   a) Ocean Thermal Energy Conversion
   b) Ocean Temperature Energy Conversion
   c) Outer Temperature Energy Conversion
   d) None of these

9) The motion of the sea surface in the form of wind waves forms a source of energy called as _____.
   a) Wind energy b) Wave energy
   c) Tidal energy d) None of these

10) There is an _____ in the temperature of the earth with increasing depth below the surface.
   a) Decrease b) Increase
   c) Both d) Not fixed

B) Fill in the blank. **06**

1) Sunlight is a _____ natural resource.
2) Coal, Petrol and Diesel are known as _____.
3) Petrol and Diesel are obtained from the mineral _____.
4) Resources which cannot be recycled are called _____ resources.
5) Solar energy is converted to electricity using _____.
6) _____ is also called Biogas.

Q.2 Solve any Eight of the following. **16**

a) What is solar energy? Define solar constant.
b) Give any two examples of non-renewable energy resources.
c) What are two basic types of wind turbine?
d) What is geothermal energy?
e) What is a difference between tide and wave?
f) Write any two disadvantages of renewable energy resources.
g) Define fill factor and efficiency of solar cell.
h) What is a composition of biogas?
i) Give any two benefits of renewable energy.
j) What is a fossil fuel?

Q.3 A) Attempt any Two of the following. **10**

1) Discuss how the concentrating collectors are advantages over flat plate collectors.
2) Describe the open cycle OTEC power plant.
3) Give a brief description on types of wind turbines.

B) Write short note on Fuel cell. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Classify fuel cells.
2) What are the advantages of wave energy?
3) Briefly describe energies from the ocean.

B) Explain with neat diagram the working of a geothermal power plant. **08**

Q.5 Attempt any Two of the following. **16**

a) What are the conventional and non-conventional energy sources? Describe the fossil fuels as the conventional energy sources.
b) What is tidal energy? Explain the working of a tidal power plant with a neat sketch.
c) With the help of neat sketch, explain the working of floating drum type biogas plant.

SLR-DA-220

Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
Geoinformatics (Special Paper - XI) (19201538)

Day & Date: Thursday, 07-12-2023 Max. Marks: 40
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Fill in blanks. **05**

1) Bedding plane between limestone and shale in vector format can be represented by _____.
   a) Point b) Line
   c) Polygon d) All of these

2) Which one of the following is NOT a type of resolution of satellite imagery?
   a) Spatial b) Spectral
   c) Temporal d) Non-spatial

3) Digital Number (DN) of each pixel represent is _____ value.
   a) Brightness value b) Dimensional
   c) Ground value d) Temperature

4) Raster data is store in _____ format.
   a) Tabular b) X-Y coordinate
   c) Pixel/grid d) Flowchart

5) Which one of the following band composites is called as true colour composite?
   a) Bands 1, 2 & 3 b) Bands 2, 3 & 4
   c) Bands 3, 4 & 5 d) Bands 4, 5 & 6

B) Answer the following questions in one sentence. **03**

1) On what basis aerial photographs are classified as vertical and oblique?
2) Name the study of the characters / interpretation of the geological features on earth surface using the aerial photographs.
3) What is the scale of large-scale aerial photographs?

Q.2 Answer any four of the following. **08**

a) How do you differentiate sand and water in aerial photographs? Why?
b) How lineament is represented in the aerial photograph?
c) Give geological examples of raster and vector data.
d) What is difference between pattern and texture in aerial photographs?
e) What is the colour of natural vegetation in IR colour image?

Q.3 A) Attempt any One of the following. **05**

1) Which wavelengths come directly to earth surface without absorption by atmosphere?
2) What information is printed on the aerial photographs?

B) Explain any temporal and spatial resolution of digital imagery. **03**

Q.4 Attempt any two of the following. **08**

a) Describe any two drainage patterns with their significance?
b) Describe various platforms of remote sensing.
c) How do you recognise dip-slope and cuesta?

Q.5 Attempt any One of the following. **08**

a) Describe in brief spectral reflectance curve.
b) Describe any four elements of photointerpretation.
c) Describe various error in flying.

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Seat No.	

Set P

B.Sc.(Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
LINUX (Special Paper - XI) (19201547)

Day & Date : Thursday, 07-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) _____ command is used to alter the permissions associated with files and directories.
   a) mv b) chgrp
   c) chown d) None of these

2) Which is GNOME?
   a) A network protocol that provides a basis for graphical user interfaces (GUIs) and input device capability for networked computers
   b) A desktop environment and graphical user interface that runs on the operating system.
   c) A Linux distribution
   d) All of the above

3) How do you view the documentation for the command ‘kill’ in the Linux terminal?
   a) kill -help b) doc kill
   c) man kill d) cat /etc/docs/kill | less

4) What does the “chmod 755 file” command?
   a) Makes the file read/write/execute by the owner, read/execute by group, and others.
   b) Makes the file execute by the owner, execute/read by the group and others
   c) Makes the file write/execute by the owner, execute by the group, and others.
   d) Makes the file read by the owner, execute by the group, and others.

5) Which directory contains all the files needed to boot the Linux system?
   a) /dev b) /boot
   c) /bin d) /usr

6) What is the output of “command1 | command2”?
   a) Command1 and Command2 run together
   b) Output command2 will be input of command1
   c) Output command1 will be input of command2
   d) Command2 run after Command1

7) _____ command used to display contents of files on standard output.
   a) Less b) Cat
   c) More d) All of these

8) Which of the following is not a valid login shell in Linux?
   a) C shell b) Net Shell
   c) Bash Shell d) Z shell

9) To create hard links instead of copies with the cp command, you use _____.
   a) -cp b) -l
   c) -perm-link d) All of these

10) Which command is used to remove a directory?
   a) rmdir b) rm-r
   c) only b d) Both a and b

B) Fill in the blanks. **06**

1) GRUB stands for _____.
2) If you wanted to execute a shell command in the background, _____ symbol put at the end of the command.
3) /etc/resolv.conf is _____.
4) LVM stands for _____.
5) The shell metacharacter $# represents _____.
6) _____ command used to write a message to all users over a network.

Q.2 Solve the following (Any Eight) **16**

a) What is redirection?
b) What does the pwd command do?
c) What is symbolic link?
d) How can you append one file to another?
e) What are the duties of a system administrator?
f) State the features of the Apache web server.
g) What is a boot loader?
h) Define the contents of the etc/passwd file.
i) List out names of various Linux distributions.
j) What is inode?

Q.3 A) Attempt the following (Any Two) **10**

1) What are the features of the Linux operating system? Explain.
2) How is Samba installed on a Linux system?
3) Differentiate between mounting and un-mounting file systems.

B) Explain the cut command in detail. **06**

Q.4 A) Attempt the following (Any Two) **08**

1) What is the architecture of Linux? Explain.
2) Explain the RAID disk partitioning technique.
3) How users are managed in Linux? Explain it.

B) Write a shell script based on the following problem to find the total number of uneducated men and women. In a town, the population of the town is 80,000 and the percentage of men is 52. Rest all are women. The percentage of the total educated is 48. If the total percentage of educated men is 35 of the total population. **08**

Q.5 Attempt the following (Any Two) **16**

a) How to compress and archive a file? Explain with an example.

b) Explain different communication commands.

c) Explain the use of the following commands:

1) diff
2) rm
3) ls
4) Uniq

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Seat No.	

Set P

B.Sc. (Semester - V) (New) (CBCS) Examination: Oct/Nov-2023
MS-EXCEL (Special Paper – XI) (19201533)

Day & Date: Thursday, 07-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks
4) Use of log tables and calculator is allowed.

Q.1 A) Choose the correct alternative. **10**

1) A formula in Excel always begins with an _____.
   a) Equal sign b) Colon
   c) Comma d) Space

2) Which of the following identifies a cell in Excel?
   a) Address b) Formula
   c) Name d) Label

3) Excel is a program that is used to prepare a _____.
   a) Slide presentation b) Spread sheet
   c) Text document d) Database

4) Which term is used to join the selected cells in one cell?
   a) Filter b) Wrap
   c) Pivot d) Merge

5) The result is a ____ value either TRUE or FALSE.
   a) Logical b) Arithmetic
   c) Algorithm d) Logarithm

6) _____ is the intersection of a row with a column.
   a) Cell b) Row
   c) Column d) All of these

7) 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

8) Pre- defined and built in formulas in Excel are known as _____.
   a) Auto sheets b) Charts
   c) Functions d) Tables

9) Workbook is a collection of _____.
   a) Worksheets b) Page set-up
   c) Buttons d) Diagrams

10) _____ is a powerful tool used to create and format spreadsheets?
   a) Adobe Photoshop CS
   b) Mozilla Firefox
   c) Microsoft office Power point
   d) Microsoft Office Excel

B) Fill in the blanks. **06**

1) Press _____ to undo in MS-EXCEL.
2) _____ of the worksheet appears vertically and are identified by letters at the top of the worksheet window.
3) Press _____ to select all rows and columns in the worksheet.
4) Press _____ to save the active file with its current file name, location, and file format.
5) _____ are equations that perform calculations on values in your worksheet.
6) _____ function is used to add the values in the function argument.

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 generate random 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) What do you mean by cells in an Excel sheet?
g) Explain what is a spreadsheet?
h) What are charts in MS- Excel?
i) Write the function for calculating p.m.f. of Poisson distribution with $\lambda = 2$.
j) Which function is used to calculate mean of numbers?

Q.3 A) Attempt any Two of the following: **10**

1) What is the order of operations used when evaluating formulas in Excel?
2) What is difference between a function and a formula in Excel?
3) How can you draw a 20 random numbers from 0 to 1?

B) Write short notes on 'Data' tab in Excel. **06**

Q.4 A) Attempt any Two of the following: **08**

1) Explain MS Excel in brief.
2) How do you find averages in MS- excel?
3) How will you write the formula for the following?
   - Multiply the value in cell A1 by 10, add 5 in the result, and divide it by 2.

B) Explain different charts in MS-Excel. **08**

Q.5 Attempt any two of the following. **16**

a) Explain the SUM and SUMIF functions with examples.
b) What are the different types of COUNTIF functions in Excel?
c) Explain RAND and RANDBETWEEN functions with examples.

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ENGLISH (COMPULSORY)
Literary Mindscapes - I (19201600)

Day & Date: Monday, 20-11-2023 Max. Marks: 40
Time: 03:00 PM To 05:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 Choose the correct alternative. **08**

1) _____ are the names of the children in the story 'Growing up'.
   a) Joss and Kady b) Jane and Karli
   c) Jade and Katie d) Jenny and Kate

2) What was Aksionov fond of when he was younger?
   a) dancing b) sleeping
   c) singing d) reading

3) _____ children are listening to the story in the poem 'Sita'.
   a) One b) Two
   c) Three d) Four

4) What was the cause of the death of the duchess?
   a) illness b) accident
   c) drowning d) the duke

5) Complete the following line.
   'A thing of beauty is a _____ forever'.
   a) cheerful b) pleasant
   c) joy d) truth

6) Charlotte Bronte says that _____ possess the golden wings.
   a) Morning dew b) Hope
   c) Butterflies d) None of the above

7) Choose the correct adverb to fill in the bank
   I am _____ tired. I want to sleep for a couple of hours.
   a) extremely b) extreme
   c) insufficiently d) sufficient

8) My teacher often says to me "If you do not work hard, you will fail"
   The correct indirect speech of the above sentence is _____.
   a) My teacher often says to me that If I do not work hard, I will fail.
   b) My teacher told to me that if I do not work hard, I will fail
   c) My teacher said that if I does not work hard, I would fail.
   d) My teacher ordered that if I am not working hard, I would fail.

Q.2 Write short answers of the following questions. (Any Four) **12**

1) What do you know about Robert Quick's wife?
2) Why did Aksionov leave the inn early?
3) What is the tragic story told by the narrator in the poem 'Sita'?
4) Describe the personality of the duchess.
5) What objects of nature does John Keats mention as a source of joy?
6) What is the theme of the poem "Life"?

Q.3 Answer any one of the following. **10**

a) Explain the three most important literacy skills (IMT).

OR

b) Discuss in detail the life skills, known as (FLIPS).

Q.4 There is a spate of motor cycle robberies in your city. Give three steps that you would take as a civically literate person and as a leader. **10**

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - XIV)
Electrodynamics (19201619)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks
4) Use of log tables and calculator is allowed.

Q.1 A) Choose correct alternatives from the options. **10**

1) Light is an _____ wave.
   a) Longitudinal b) Magnetic
   c) Electric d) Electromagnetic

2) The intensity of radiation along the axis of electric dipole is _____.
   a) maximum b) zero
   c) infinity d) same

3) Velocity of light in free space is given by _____.
   a) $c = \sqrt{\mu_0 \in_0}$ b) $c = \sqrt{\in_0/\mu_0}$
   c) $c = \sqrt{\mu_0/\in_0}$ d) $c = 1/\sqrt{\mu_0 \in_0}$

4) Electric field intensity E in terms of scaler potential ϕ is given by _____.
   a) $E = -\nabla\phi$ b) $E = 1/-\nabla\phi$
   c) $E = \nabla\phi$ d) $E = 0$

5) The equation of Continuity is in accordance with the law of conservation of _____.
   a) Energy b) Momentum
   c) Charge d) Mass

6) The statement 'magnetic free poles do not exist' is justified by Maxwell's equation _____.
   a) $\nabla \cdot B = 0$ b) $\nabla \cdot \mathrm{B} = \rho$
   c) $\nabla \times \mathrm{B} = \mathrm{J} + \delta\mathrm{D}/\delta\mathrm{t}$ d) $\nabla \times \mathrm{B} = \partial\mathrm{B}/\partial\mathrm{t}$

7) β denotes the _____ of EM waves in conductors.
   a) reflection coefficient b) transmission coefficient
   c) diffraction coefficient d) absorption coefficient

8) For charge free region Poisson's equation is given as _____.
   a) $\nabla^2\phi = \infty$ b) $\nabla^2\phi = \varepsilon_0/\rho$
   c) $\nabla^2\phi = \varepsilon_0$ d) $\nabla^2\phi = 0$

9) The Electromagnetic field vectors of electromagnetic waves are not in same phase in _____ medium.
   a) dielectric b) insulator
   c) conductor d) vacuum

10) Lenz's law gives _____ and Faraday's law gives _____ of induced emf.
   a) direction, magnitude b) magnitude, direction
   c) Resistance, voltage d) current, voltage

B) Fill in the blanks/ One word answer. **06**

1) Generation of motional emf is principle of _____.
2) Formulation of Empirical laws in Electricity & Magnetism are known as _____ equations.
3) Energy radiated by an Electric dipole is _____ energy.
4) The line integral of electric force per unit charge over a closed path is _____.
5) Electromagnetic wave equations are also called as _____.
6) What is the effect of conducting medium on amplitude of electromagnetic waves?

Q.2 Solve any eight of the following: **16**

a) Define Ampere's circuital law.
b) An EM wave experiences 30% reflection in a medium. What is the percentage of transmission of EM wave?
c) State Faraday's law of Induction.
d) What is Skin depth?
e) Define displacement current density of charges.
f) State Gauss law in Electrostatics.
g) Define Biot-Savart's law in vector form.
h) State the principle of transformer.
i) State Poynting's theorem.
j) What do you mean by Electric dipole?

Q.3 A) Attempt any two of the following: **10**

1) Explain the physical significance of integral form of Maxwell's equations
2) Considering Maxwell's equations in vacuum find out wave equations and wave velocity equation.
3) Derive Newmann formula for Mutual inductance of two coils.

B) Short note/Solve **06**

Give the graphical representation of a propagating plane EM wave. Hence, define wave impedance and state its unit.

Q.4 A) Attempt any two of the following: **08**

1) Draw the diagram for Reflection & Refraction of EM waves & hence write the expressions for transmission coefficient & reflection coefficient of EM wave.
2) State Maxwell's equations for Plane EM waves in Dielectrics.
3) A glass-air interface has RI, $n_2 = 1.562$ and $n_1 = 1.0$ for normal incidence of EM wave. Calculate Transmission coefficient T and Reflection coefficient R of the wave.

B) Describe/Explain/Solve **08**

Obtain the boundary condition for electromagnetic field vectors $\vec{D}\ \vec{E}\ \vec{B}$ and $\vec{H}$ at the interface of two media.

Q.5 Attempt any two of the following. **16**

a) State Poisson's and Laplace equations. Obtain solution for Laplace's equation in spherical coordinate system, when potential is independent of azimuthal angle.

b) Considering the plane wave solution for electromagnetic waves in vacuum, show that electromagnetic waves are transverse and vectors $\vec{E}$ $\vec{H}$ and $\vec{K}$ are orthogonal.

c) Explain retarded time and obtain an expression for the retarded scaler potential φ and retarded potential $\vec{A}$.

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Seat No.	

Set P

B.Sc.(Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Special Paper - XIII)
Physical Chemistry (19201610)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks
4) Use of log tables and calculator is allowed.

Q.1 A) Choose the correct alternative from the options. **10**

1) Stokes lines are frequently much more _____ than the anti-Stokes lines.
   a) thinner b) broader
   c) intense d) weaker

2) A solution contains A moles of solute and B moles of solvent then mole fraction of solvent is, $x =$ _____.
   a) $x = B/(A+B)$ b) $x = A/(A+B)$
   c) $x = A/A \times B$ d) $x = B/A \times B$

3) The magnitude of energy of activation depends on the _____.
   a) nature of reactants
   b) Temperature
   c) concentration of reactants
   d) all of these

4) The equation $W_{max} = RT \ln Kp + \Delta nRT$, represents _____.
   a) Clapeyron Equation b) Van't Hoffs isochore
   c) Van't Hoffs isotherm d) Clausius equation

5) Molecules having pure rotational spectra are _____.
   a) H_2, O_2 b) HCl, N_2
   c) CO, HF d) CO_2, Cl_2

6) According to _____ the partial vapor pressure of volatile component A of a solution is given by $P_A = P^0{}_A \times X_A$.
   a) Dalton's law b) Raoul's law
   c) Avogadro's law d) None of these

7) Equation, $G = G^0 + RT \log_e a$, if $a = 1$, then equation becomes as $G =$ _____.
   a) $G = G^0$ b) $G = G^0 + RT$
   c) $G = 0$ d) None of the above

8) For the reaction $A + B \rightarrow$ products, it is found that the rate $k[A]^l[B]^m$ Then the order of reaction is _____.
   a) $(1+m)$ b) $(1-m)$
   c) $(1 \times m)$ d) $(1/m)$

9) Total energy of molecule increases from _____.

a) $E_{vib} < E_{rot} < E_{ele}$ b) $E_{rot} < E_{vib} < E_{ele}$

c) $E_{ele} < E_{vib} < E_{rot}$ d) $E_{vib} < E_{ele} < E_{rot}$

10) If P is the atmospheric pressure then the condition for boiling the mixture of two liquid components A and B is P = _____.

a) $(P_A + P_B)$ b) $(P_A - P_B)$

c) (P_A/P_B) d) $(P_A \times P_B)$

B) Attempt the following. **06**

1) Define wavenumber and give its unit.
2) What is zeotropic mixture?
3) Write general integrated form of Clapeyron Clausius equation.
4) Apply the law of mass action to the following equilibrium system

$$N_{2(g)} + 3H_{2(g)} \rightleftharpoons 2NH_{3(g)}$$

5) Mention the steps involved in Chain reactions.
6) Define temperature coefficient.

Q.2 Solve any Eight of the following: **16**

a) Mention types of simultaneous reactions.
b) Define parallel reaction. Give its example.
c) State Raoult's law.
d) What are the applications of Clapeyron-Clausius equation?
e) Define: molarity and molality.
f) Give criteria for thermodynamic equilibrium and spontaneity.
g) Show relation between free energy and Helmholtz function.
h) Select among the following molecules having pure rotational spectra.
$CS_2, N_2, HF, CO_2, CO, Cl_2$
i) What is standard free energy?
j) What is zero point energy?

Q.3 A) Attempt any two of the following: **10**

1) Describe vibrational spectra of a diatomic molecule as a harmonic oscillator.
2) What is azeotropic mixture? Explain the distillation of solution with system having maximum boiling point.
3) Derive Van't Hoffs isochore.
The equilibrium constant for the reaction $H_2 + I_2 \leftrightharpoons 2HI$ is 80 at 300 °C. Calculate the standard free energy of this reaction.
$(R = 8.314\ JK^{-1}mol.^{-1})$

B) Define and explain third order reaction. Derive expression for third order reaction with equal initial concentrations of all reactants. **06**

Q.4 A) Attempt any two of the following: **08**

1) Write note on mutual exclusion principle.
2) Write note on transition state theory.
3) Distinction between ideal and non-ideal solutions.

B) Give an account of fugacity and activity concept. **08**

Q.5 Attempt any two of the following. **16**

a) Derive Arrhenius equation to calculate energy of activation of a reaction. Calculate the energy of activation of a reaction whose reaction rate at 27°C gets doubled for 10 °C rise in temperature. $(\mathrm{R} = 8.314\ \mathrm{JK}^{-1}\mathrm{mol.}^{-1})$

b) Define critical solution temperature. What are the types of CST? Discuss in detail phenol-water system.

c) What is Raman effect? Discuss quantum theory of Raman effect.

SLR-DA-226

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XIII)
Plant Pathology (19201601)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks
4) Use of log tables and calculator is allowed.

Q.1 A) Choose correct alternatives from the options. **10**

1) The downy mildew of grapes is caused by _____.
   a) *Plasmopara viticola* b) *Phytophthora infestans*
   c) *Oidium mangiferae* d) *Pythum aphanidermatum*

2) Brown rust of Wheat chemically control by _____.
   a) unithiocarbonates b) trithiocarbonates
   c) thiocarbonates d) dithiocarbonates

3) Wilt of pigeon pea disease occurs on _____.
   a) tur b) wheat
   c) maize d) sugarcane

4) Brwon spot of maize disease was first reported from India in _____.
   a) 1912 b) 1914
   c) 1921 d) 1927

5) Little leaf of brinjal disease is also known as _____ disease.
   a) rust b) smut
   c) eggplant d) all of these

6) Telyadisese control with the help of _____.
   a) Mancozeb 0.25% b) Mancozeb 0.26%
   c) Mancozeb 0.27% d) Mancozeb 0.28%

7) Citrus canker disease occurs on _____.
   a) grapes b) pomegranate
   c) lemon d) bhendi

8) _____ dealing with the study of nature and structure of airborne biological materials.
   a) Aerobiology b) Geology
   c) Phycology d) Virology

9) Aerobiology is directly associated with other scientific branches like ____.
   a) Plant Pathology b) Animal Pathology
   c) Polynology d) All of these

10) Study of atmosphere pollution through genetic material in the atmosphere is known as _____.
   a) genecology b) polyndology
   c) meteorology d) phytogeography

B) Fill in the blanks. **06**

1) The word _____ has been derived from Greek words Pathos means suffering.
2) According to Stakman and Harrar in _____ plant disease is a physiological disorder.
3) Characteristics of pathogen of being very able to cause disease is known as _____.
4) The physiological or morphological changes as a result of disease are known as _____.
5) Fruit rot is the most common disease of cucurbits in _____.
6) The late blight of _____ is caused by *Phytophthora infestans*.

Q.2 Solve any eight of the following: **16**

a) What is rot?
b) Give the definition of wilt.
c) What is mean by powdery mildew?
d) Define aerobiology.
e) What is seed borne?
f) Define the seed pathology.
g) Define host.
h) What is infection?
i) Give the definition of plant pathology.
j) Define Immunity.

Q.3 A) Attempt any two of the following: **10**

1) Explain the symptoms and disease cycle of downy mildew of grapes.
2) Describe the concept of disease studied by you.
3) Describe the symptoms and control measures of white rust of crucifers.

B) Write short notes any two of the following. **06**

1) Control measures of brown rust of wheat
2) Symptoms of late blight of potato
3) Disease cycle of fruit rot of cucurbits

Q.4 A) Attempt any two of the following: **08**

1) Explain the solar seed treatment studied by you.
2) Write the symptoms, causal organism and control measures of Tikka Disease of Groundnut.
3) Describe the symptoms, causal organism and control measures of Red Rot of Sugarcane.

B) Attempt any two of the following. **08**

1) Explain the inoculation studied by you.
2) Give the penetration studied by you.
3) Describe the incubation period studied by you.

Q.5 Attempt any two of the following. **16**

a) Describe the symptoms, causal organism, disease cycle and control measures of Citrus Canker.
b) Explain the seed certification studied by you.
c) Explain the symptoms, causal organism, disease cycle and control measures of Telya Disease.

SLR-DA-227

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Special Paper - XIII)
Animal Physiology: Life Sustaining Systems (19201627)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternative from the options. **10**

1) Pepsinogen can be converted into pepsin by _____.
   a) HCL b) entrogastrin
   c) gastrin d) enterokinase

2) The enzyme carbonic unhydrase is present in _____.
   a) WBC b) RBC
   c) palates d) plasma

3) The most common respiratory pigment in human is _____.
   a) haemocyanin b) haemoerythrin
   c) haemoglobin d) None of these

4) This artery passes blood to the kidney _____.
   a) Common iliac b) Cystic
   c) Renal d) Celiac

5) One of the following blood group, is the universal donor _____.
   a) A b) B
   c) AB d) O

6) Blood pressure is first discovered by _____.
   a) Hales b) Malpihgi
   c) Harrey d) Golgi

7) In human number of heart beat per minute _____.
   a) 52 b) 72
   c) 82 d) 92

8) Which one of the following is stress hormone?
   a) thyroxin b) testosterone
   c) cortisol d) estrogen

9) Rh+ boy growing in the uterus of Rh- mother will be affected with _____.
   a) erythroblastosis foetalis b) thalasmia
   c) goiter d) mysidema

10) Glissons capsule are found in _____.
   a) pancreas b) kidney
   c) spleen d) liver

B) Answer in one sentence. **06**

1) Parts of alimentary canal
2) Inspiration
3) Haemocyanin
4) Dialysis
5) Rh antigen
6) Yoga

Q.2 Solve any eight of the following: **16**

a) Digestion in buccal cavity
b) Transport of oxygen
c) Haemoerythrin
d) Leucocytes
e) Pacemaker
f) Nephron
g) Blood pressure
h) Chyle
i) Mediation
j) Bhors effect

Q.3 A) Attempt any two of the following: **10**

1) Explain digestion in small intestine.
2) Describe structure of kidney.
3) Explain cardiac cycle.

B) Write short notes on. **06**

Describe the process of urine formation.

Q.4 A) Attempt any two of the following: **08**

1) Explain composition of blood.
2) Describe origin conduction of heartbeat.
3) Explain transport of CO_2.

B) Write short notes on. **08**

Describe ABO blood group system.

Q.5 Attempt any two of the following. **16**

a) Explain blood clotting system.
b) Describe managing stress with the help of exercise, yoga & meditation.
c) Explain Gastric Digestion.

SLR-DA-228

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - XIII)
Metric Spaces (19201635)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks

Q.1 A) Choose correct alternatives for each of the following. **10**

1) The _____ inequality states that the length (norm) of the sum of two sequences in ℓ^2 is less than or equal to the sum of their lengths.
   a) Schwarz b) Minkowski
   c) Cauchy d) Holder's

2) If $\{S_n\}_1^\infty \in \ell^2$ then $\lim_{n\to\infty} S_n =$ _____.
   a) 0 b) 1
   c) S d) any non-zero finite number

3) $\lim_{x\to 3^-} \frac{1}{x-3} =$ _____.
   a) 0 b) $-\frac{1}{6}$
   c) ∞ d) $-\infty$

4) If a is any point in R_d then $B[a\,;2] =$ _____
   a) a b) $\{a\}$
   c) R d) R_d

5) Let $I_n = \left\{\left(-\frac{1}{n}, \frac{1}{n}\right) : n \in N\right\}$, then $\cap_{n=1}^{\infty} I_n$ equals _____
   a) $\{\ \}$ b) $\{0\}$
   c) $\{1\}$ d) $(-1, 1)$

6) In R^1, then diameter of the set $\{0,1,2, \ldots, 100\}$ is _____
   a) 1 b) 99
   c) 100 d) 101

7) In any metric space, every finite set is_____
   a) closed b) open
   c) both open and closed d) neither open nor closed

8) Which of the following metric space is not complete under metric $d(x, y) = |x - y|$
   a) z b) R
   c) C d) Q

9) With the absolute value metric, R is _____
   a) bounded b) totally bounded
   c) compact d) not compact

10) The subset $[0, \infty)$ of R is _____

a) bounded b) open

c) closed d) countable

B) Fill in the blanks. **06**

1) $\lim_{x \to 0} \sin\left(\frac{1}{x}\right) =$ _____

2) With usual meanings and for $n \in I$, $\lim_{x \to n^-} [x] =$ _____

3) If the sunset of A of M is dense in M then _____

4) If $M = R$ with the absolute value metric, then $B\left[\frac{1}{4}; \frac{1}{2}\right] =$ _____

5) A subset A of R_d is totally bounded if and only if _____

6) If $f: A \to R^1$ and f attains a maximum value at $a \in A$ then $f(a) =$ _____

Q.2 Solve any eight of the following: **16**

a) Show that the sequence $\left\{\frac{1}{\sqrt{n}}\right\}_{n=1}^{\infty}$ is not an element of ℓ^2.

b) If $|x - 2| < 1$, prove that $|x^2 - 4| < 5$

c) In an Euclidean 3-space, describe $B[0; 1]$.

d) Define the term limit points.

e) If $A = [2, 3)$ then find $\bar{A}$.

f) Prove that every subset of R_d is open.

g) Define the term totally bounded set.

h) If $T(x) = x^2 \quad (0 \leq x \leq \frac{1}{3})$

Prove that T is a contraction on $[0, {}^1/_3]$

i) Define the term Heine - Borel property.

j) Prove that any set with a discrete metric d is a bounded metric space.

Q.3 A) Attempt any two of the following: **10**

1) If $A = (0, \infty)$, prove that
$d(x, y) = \left|\frac{1}{x} - \frac{1}{y}\right| \forall\, x, y \in A$ is a metric for A.

2) Prove that in a metric space, every open sphere is an open set.

3) If f is a continuous function from the compact metric space M_1 into the metric space M_2, then prove that $f(M_1)$ is compact.

B) If the subset A of the metric space $< M, \varrho >$ is totally bounded, then prove that A is bounded. **06**

Q.4 A) Attempt any two of the following: **08**

1) Show that a sequence of points in any metric space cannot converge to two distinct limits.

2) Show that the closed interval $[0, 1]$ contains all of its limit points.

3) Prove that the metric space $[0, 1]$ (with absolute value metric) is complete.

B) Prove that R^2 is a complete metric space. **08**

Q.5 Attempt any two of the following. **16**

a) Fix $n \in I$. If $x = < x_1, x_2, \ldots, x_n >$ and $y = < y_1, y_2, \ldots, y_n >$ are two ordered n-tuples of real numbers, then show that ϱ is a metric for R^n, where

$$\varrho(x, y) = \left[\sum_{k=1}^{n} (x_K - y_k)^2\right]^{1/2}$$

b) Prove that f is continuous if and only if the inverse image of every open set is open.

c) If M is a compact metric space, then prove that M has the Heine-Borel property.

SLR-DA-229

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - XIII)
Statistical Inference - II (19201643)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks
4) Use of log tables and calculator is allowed.

Q.1 A) Choose correct alternatives from the option. **10**

1) Which of the following is correct if $P\ (5.25 \leq\ \theta \leq 20.25) = 0.95$
   a) 5.25 and 20.25 are 95% confidence limit
   b) The length of the confidence interval is 20
   c) Both a) and b)
   d) None of These

2) Neyman - Pearson lemma provides _____.
   a) Unbiased C. R. b) Most powerful C. R.
   c) Admissible C. R. d) Minimal C. R.

3) In Sequential Probability Ratio Test (SPRT) the sample size is _____.
   a) fixed b) a random variable
   c) fixed but small d) fixed but large

4) Which of the following is applicable to paired data?
   a) The Sign test
   b) The Median test
   c) Wilcoxon's signed rank test
   d) Both a) & c)

5) 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)

6) The ratio of likelihood under H_0 and the entire parametric space is called _____.
   a) Probability ratio b) Sequential probability ratio
   c) Likelihood ratio d) None of These

7) Test of $H_0: \mu = 70$ against $H_1: \mu > 70$ leads to _____.
   a) left tailed test b) right tailed test
   c) two tailed test d) none of these

8) A test which is at least as powerful as any other test of the same size is known as _____.
   a) M. P. test b) U. M. P. test
   c) L. R. test d) None of these

9) Wilcoxon's signed-rank test considers the differences $(X_i - M_0)$ by way of _____.
   a) signs only
   b) magnitude only
   c) signs and magnitude both
   d) all the above

10) For finding the confidence interval for ratio of variances of two normal populations, the distribution used is _____.
   a) chi-square b) t
   c) F d) none of these

B) Define the following. **06**

1) Simple and composite hypothesis
2) Type-1 error
3) Power of test
4) Pivotal quantity
5) Null and alternative hypothesis
6) Run

Q.2 Explain the following terms. (Any Eight) **16**

a) Most powerful test
b) Level of significance
c) U.M.P. test
d) Type-2 error
e) Size of test
f) One sided confidence interval
g) State confidence interval for μ when σ^2 is known in case of $N(\mu, \sigma^2)$ distribution.
h) State confidence interval for population proportion P.
i) Critical region
j) Average Sample Number (ASN) function

Q.3 A) Attempt any two of the following: **10**

1) A coin is for which the probability of occurrence of head is P, thrown 7 times and null hypothesis is $H_0: P = ½$ tested against $H_1: P = ¼$ is accepted more than one head appears, then compute
   i) size of test ii) power of test
2) Obtain $100(1-\alpha)\%$ confidence interval for the parameter μ in case of $N(\mu, \sigma^2)$ distribution, when σ^2 is known.
3) Describe the procedure of median test.

B) Explain the run test for two samples. **06**

Q.4 A) Attempt any two of the following: **08**

1) Obtain M.P. critical region for the distribution
   $f(x) = \Theta\, e^{-\Theta x}; x \geq 0$
   $= 0$; otherwise
   for testing the hypothesis $H_0: \Theta = 2$ against $H_1: \Theta = 1$ based on a r. s. of size n drawn from distribution $f(x)$.
2) Let X be a Bernoulli variate with p.m.f
   $P(x, \Theta) = \Theta^x (1-\Theta)^{1-x};\ x = 0, 1, \quad 0 \leq x \leq 1$
   Construct SPRT test for testing $H_0: \Theta = \Theta_0$ against $H_1: \Theta = \Theta_1$
3) Obtain $100(1-\alpha)$ confidence interval for ratio of two population variances in case of normal distribution.

B) Derive the likelihood ratio test for testing $H_0: \mu = \mu_0$ against $H_1: \mu \neq \mu_0$ when a sample of size n is taken from $N(\mu, \sigma^2)$. **08**

Q.5 Attempt any two of the following. **16**

a) State and prove Neyman- Pearson lemma.

b) State the procedure of Kolmogorov - Smirnov test for two independent samples.

c) Describe the procedure of Mann-Whitney U-test.

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper - XIII)
Photogeology & Remote Sensing (19201652)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Choose correct alternatives from the options. **10**

1) The software used for GIS analysis is _____.
   a) Adobe photoshop b) Erdas Imagine
   c) Windows d) ArcGIS

2) A linear geologic feature observed on the satellite image which represent subsurface weak zone is _____.
   a) Lineament b) Strike
   c) Dip d) Dam

3) In the high oblique aerial photographs, tilt angle of the axis is _____.
   a) 20°-30° b) 30°-40°
   c) 40°-60° d) 60°-90°

4) Sandstones show _____ tone in the aerial photograph.
   a) black b) Dark
   c) intermediate d) Light

5) A unique reflectance pattern of individual object on the earth is called as _____.
   a) spectral signature b) optical sign
   c) spatial signature d) signature

6) Which one of the following is NOT a type of resolution of satellite imagery?
   a) spatial b) spectral
   c) temporal d) non-spatial

7) Which one of the following requires more storage space of your computer?
   a) raster data b) vector data
   c) non-spatial data d) None of these

8) Basic elements of vector data are _____.
   a) point b) line
   c) polygon d) all of these

9) An intersection point where two or more vector lines meet is _____.
   a) code b) node
   c) corner d) junction

10) The spectrum that reaches the earth without absorption by atmosphere is known as _____.
   a) Atmospheric doors b) Atmospheric holes
   c) Atmospheric windows d) Atmospheric gap

B) Answer the following questions in one sentence. **06**

1) What is the scale of 'very small-scale photographs'?
2) What is the percentage of side lap for aerial photographs?
3) In which type of resolution, the pixel size is considered?
4) What are the three types of vector formats used in GIS analysis?
5) What are two processes including in image enhancement?
6) What is swath?

Q.2 Solve any eight of the following: **16**

a) What is sensor and its types?
b) Give the specifications of LISS IV sensor.
c) What is temporal resolution?
d) How do you recognize drainage pattern from the aerial photographs?
e) What are fiducial marks?
f) What is mosaicking of photographs?
g) Why overlapping of photographs is essential?
h) How do you recognise the difference in height of the objects in aerial photographs?
i) Name the Indian space programme agency.
j) What is attribute data?

Q.3 A) Attempt any two of the following: **10**

1) What are types of aerial photographs based on optical axis position?
2) List the elements of remote sensing.
3) What does the term orbit mean and what is the difference between open and closed orbits?

B) Describe various information printed on the aerial photographs. **06**

Q.4 A) Attempt any two of the following: **08**

1) Describe hyperspectral sensors.
2) Describe EMR interaction with earth surface objects.
3) Explain atmospheric windows

B) Describe components of GIS. **08**

Q.5 Attempt any two of the following. **16**

a) Explain image enhancement.
b) Describe various data models in GIS.
c) Describe various elements of photointerpretation.

SLR-DA-231

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - XIII)
Microbial Genetics (19201660)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Multiple Choice Questions **10**

1) R plasmids are the plasmids that _____
   a) Have an effect on the production of bacterial toxins
   b) Have the effect on resistance to antibiotics
   c) Have control over structural components of pathogenic bacteria
   d) None of the above

2) The E. Coli chromosome is a closed-circular DNA of length 4.6 million base pairs, which resides in a region of the cell called the _____.
   a) Nucleosome b) Nucleotide
   c) Nucleoid d) DNA domains

3) The flow of genetic information in microbial cells usually takes place from _____.
   a) RNA - DNA - Protein b) Proteins - RNA - DNA
   c) DNA - RNA - Protein d) None of these

4) Most common mode of DNA replication is _____.
   a) Circular b) Conservative
   c) Dispersive d) Semiconservative

5) DNA Fingerprinting techniques was developed by _____.
   a) Francis Crick b) Hargovind Khurana
   c) Alec Jeffrey d) James Watson

6) _____ provide the binding site for RNA polymerase in Operon system.
   a) Promoter b) Operator
   c) Repressor d) Inducer

7) During replication of DNA. synthesis of DNA on lagging strand takes place in fragments, these fragments are called as _____.
   a) Satellite fragments b) Double helix segments
   c) Korenberg Segments d) Okazaki Fragments

8) _____ type of gel electrophoresis most commonly used for separation of large DNA fragments.
   a) PAGE b) SDS PAGE
   c) Agarose d) RFLP

9) Genetic complementation test discovered by _____.
   a) S. Benzer b) S. Altman
   c) Griffith d) Watson

10) If a particular short DNA sequence is AGATTC, the corresponding mRNA sequence will be _____.
   a) AGATTC b) TCTAAG
   c) AGAUUC d) UCUAAG

B) Define the following / Fill in the Blanks **06**

1) Define Genotype.
2) NCBI Stands for _____
3) Define Transcription.
4) Define Operon.
5) Define genetic engineering.
6) Define DNA Replication.

Q.2 Solve any eight of the following: **16**

a) What are Restriction endonucleases and give any two examples?
b) Write short note on Protein Data Bank.
c) What is Linker and give its use?
d) Role of RNA polymerase in transcription.
e) Write in short about Okazaki Fragments.
f) Enlist various types of vectors used in genetic engineering.
g) Define DNA sequencing.
h) Define Phenotypic lag.
i) Write in short Applications of the Gene bank.
j) What is Promotor and give its use in gene regulation.

Q.3 A) Attempt any two of the following: **10**

1) Describe in short about post transcriptional modifications.
2) Describe in short about applications of DNA fingerprinting.
3) Describe in short Cis-Tans test.

B) Define Protein engineering and describe in detail its applications. **06**

Q.4 A) Attempt any two of the following: **08**

1) Describe in short about folded fiber model.
2) Describe in short about concept and applications of BLAST.
3) Describe in short about effect of mutation on phenotype.

B) Describe in detail about Selection, Detection and Isolation of mutants. **08**

Q.5 Attempt any two of the following. **16**

a) Define electrophoresis and explain in detail about procedure and application of the electrophoresis of DNA.
b) Describe in detail about concept, structural organization and mechanism of Lac Operon.
c) Describe in detail about tools used and applications of genetic engineering.

SLR-DA-232

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Special Paper - XIII)
Power Electronics (19201676)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log tables and calculator is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) _____ device is a normally on device.
   a) Power diode b) Power BJT
   c) SIT d) IGBT

2) The SCR is turn off if the anode current is reduced below the _____.
   a) gate current b) latching current
   c) resonating current d) holding current

3) In controlled rectifier _____ commutation is used.
   a) forced b) line
   c) load d) all of these

4) In SCR based series inverters _____ type of commutation is used.
   a) Class A b) Class C
   c) Class B d) Class F

5) UPS means _____.
   a) Uninterrupted Power SCR
   b) Unijunction Power Supply
   c) Uninterrupted Power Supply
   d) Under Performance SCR

6) The buried gate is fabricated in _____ device.
   a) GTO b) SCR
   c) PUT d) SIT

7) _____ exhibits negative resistance property like UJT.
   a) GTO b) PUT
   c) SIT d) IGBT

8) SCR is a _____ triggered device.
   a) current b) voltage
   c) field d) source of light

9) In the controlled rectifier if the firing angle of the SCR is increased, the average voltage supplied to the load is _____.
   a) increases b) remain same
   c) decreases d) none of these

10) A PUT is generally used in _____.
   a) a rectifier circuit b) power amplifier
   c) filter d) saw-tooth oscillator

B) Fill in the blanks. **06**

1) Power MOSFET is a _____ controlled device.
2) Another name for Class C commutation is _____.
3) SMPS means _____.
4) In SCR the magnitude of latching current is always _____ the holding current.
5) The buried gate is fabricated in _____ device.
6) A power circuit which converts DC into AC is called as _____.

Q.2 Solve any eight of the following: **16**

a) Why power devices are not operated with higher frequency?
b) Draw the symbol of IGBT and PUT.
c) What do you mean by Phase control?
d) State the four applications of SCR.
e) Draw the block diagram of UPS.
f) Define Latching and holding current.
g) Define reverse recovery time of power diode.
h) Define the function of drift layer of power devices.
i) Define threshold voltage of power MOSFET.
j) Define commutation of the SCR.

Q.3 A) Attempt any two of the following: **10**

1) Give the construction of SIT.
2) Explain in brief the working of battery charger circuit using SCR**.**
3) Explain working of single-phase full bridge inverter using SCR.

B) Explain Emergency Lighting System by using SCR. **06**

Q.4 A) Attempt any two of the following: **08**

1) Explain working of single-phase full wave-controlled rectifier with resistive load.
2) Give the construction of power MOSFET.
3) Explain working of RC triggering circuit.

B) Draw the two-transistor model of SCR and explain it. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain working of single-phase full wave controlled rectifier with inductive load and effect of free wheel diode.
b) Explain Class C commutation technique of SCR.
c) Explain step-down and step-up chopper using SCR.

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper - XIV)
Web Technology (19201668)

Day & Date: Tuesday, 21-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks

Q.1 A) Choose the correct alternatives from the option. **10**

1) What is the extension of the ASP.NET page?
   a) .asp b) .aspx
   c) .asx d) .apx

2) Which of the following is not an ASP.NET event?
   a) Init b) Import
   c) Load d) All

3) Which of the following is not an ASP.NET component?
   a) LinkCounter b) Counter
   c) AdRotator d) File Access

4) Web.config file is used _____.
   a) Configures the time that the server-side code behind module is called
   b) To store the global information and variable definitions for the application
   c) To configure the web server
   d) To configure the web browser

5) Default Session data is stored in ASP.Net.
   a) StateServer b) Session Object
   c) InProcess d) All of the above

6) Which control can be used to update only the portion of the page?
   a) UpdatePanel b) ScriptManager
   c) AsyncPostBackTrigger d) None

7) Which is the mandatory property for all validation controls?
   a) ControlToValidate b) Message
   c) EnableClientScript d) EnableServerScript

8) To perform Insert, Update and Delete Command which method is used?
   a) ExecuteScalar b) ExecuteReader
   c) ExecuteNonQuery d) None

9) File Upload server control use _____ method to save file on the server
   a) SaveAs() b) Upload()
   c) ServerSave() d) Save()

10) Windows-Based Authentication is well suited for _____.
   a) Intranet environment b) Desktop application
   c) Public web site d) None of the above

B) Fill in the blank. **06**

1) .aspx is extension of _____.
2) IIS Stands for _____.
3) _____ method uses to retrieve a single value from a database in ADO.Net
4) _____ is used to navigate to other pages/sites running on same web server
5) _____ is the process of allowing an authenticated users to access the resources by checking whether the user has access rights to the system.
6) The _____ directive associates aliases with namespaces and class names for notation in custom server control syntax.

Q.2 Solve any eight of the following: **16**

a) What is Cross Page posting?
b) List out different application folder in asp.net.
c) How to create Application?
d) What is hidden field?
e) What is caching?
f) What is Garbage Collector?
g) List out AJAX control in ASP.Net.
h) What is the use of Global.asax file?
i) List Different list control in ASP.Net.
j) What is client side validation?

Q.3 A) Attempt any two of the following: **10**

1) What is validation? Explain with its type.
2) Design a web page which use TreeView Control.
3) What are the advantages of AJAX?

B) Explain ViewState with example. **06**

Q.4 A) Attempt any two of the following: **08**

1) Explain App_Code application folder.
2) Differentiate Data Reader and Dataset.
3) Design web page for ASP table control for employee having (empid,name,address, salary).

B) Design a web page which uses all validation controls. **08**

Q.5 Attempt any two of the following. **16**

a) Design a web page which insert,delete,update student information using ADO.net
b) What is master page? Design a master page for College web site.
c) Design a web page which use Adrotator control.

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - XV)
Materials Science (19201620)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculator is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) _____ of the following is not synthetic polymer.
   a) Rubber b) Nylon (6, 6)
   c) Rayon d) Polythene

2) Electrical conductivity is the _____ of the electrical resistivity.
   a) reciprocal b) double
   c) square d) cube

3) The volume of expansion coefficient is approximately equal to _____ times the linear expansion.
   a) 2 b) 3
   c) 4 d) 5

4) The degree of crystallinity of a polymer depends on the _____.
   a) rate of heating b) rate of cooling
   c) rate of flow d) none of the above

5) The stress and strain relationship in a polymer is _____ like that of metal.
   a) linear b) not linear
   c) zigzag d) not zigzag

6) Ceramic are generally _____ of electricity.
   a) good conductor b) bad conductor
   c) poor conductor d) superconductor

7) _____ is used for orthopaedic application.
   a) Stainless steel rod b) Ceramic rod
   c) Iron rod d) Glass rod

8) Carbon nano tubes are also called as _____.
   a) bucky balls b) bulky tubes
   c) bulk tubes d) bucky tubes

9) Diffraction technique is used to determine _____.
   a) band gap b) contact angle
   c) crystal structure d) morphology

10) Wet-chemical technique is also known as _____.
   a) electrodepositing b) spray pyrolysis
   c) sol-gel d) plasma synthesis

B) Fill in the blank/Definition/One sentence answer/One-word answer /Give the name/Predict the product etc. **06**

1) _____ is the ability of material to be drawn into small sections from a large section.
2) Injection moulding is the main process of forming ____ polymers.
3) Give the full form of PVC.
4) The polymers are composed of a large number of repeating units or molecules called _____.
5) Give the names of two types of thin film deposition methods.
6) Name the two types of spectroscopic characterization techniques.

Q.2 Attempt any EIGHT of the following: **16**

a) Define Curie temperature.
b) What are composite materials?
c) Define degree of polymerization.
d) Draw the schematic diagram of ZnS structure.
e) List the ceramic processing techniques.
f) List the applications of composites.
g) State the properties of composites.
h) Draw of neat labelled diagram of SWCNT and MWCNT.
i) What are biomaterials?

Q.3 A) Attempt any TWO of the following: **10**

1) Explain addition and condensation polymerization with examples.
2) Explain CBD method for thin film deposition.
3) Explain particle reinforced composites.

B) Write a short note on magnetic properties of materials. **06**

Q.4 A) Attempt any TWO of the following: **08**

1) Explain thermoplastics and thermosetting polymers.
2) A paramagnetic material has a magnetic field intensity of 10^4 Am^{-1}. If the susceptibility of the material at room temperature is 4.6×10^{-3} then calculate the magnetization of the material.
3) Mention applications of nanomaterials.

B) Solve **08**

The absolute refractive indices of glass and water are 1.3 and 3/2 respectively. If the speed of light in glass is 2×10^8 m/s. Calculate the speed of light in a) vacuum b) water c) refractive index of glass w.r.t water.

Q.5 Attempt any TWO of the following: **16**

a) Explain different types of biomaterials and their applications in the medical field.

b) What are ceramic materials? Explain mechanical properties of ceramic materials and state their applications.

c) Explain different fabrication processes of composites.

SLR-DA-235

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Special Paper - XIV)
Inorganic Chemistry (19201611)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculator is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) Actinides are placed in _____ period.
   a) III B group and 6^{th} b) II A group and 7^{th}
   c) III B group and 7^{th} d) IV B group and 7^{th}

2) Name of the element having atomic number 115 is _____.
   a) un-un-unium b) un-nil-pentium
   c) un-bi-pentium d) un-un-pentium

3) In March 1987ceramic superconductor was reported by scientist _____.
   a) Muller b) Wu Chu
   c) Bednorz d) K Onnes

4) The critical temperature of mercury is _____ K.
   a) 4.15 b) 7.19
   c) 29.8 d) 0.56

5) In xenon difluoride Xe —F bond distance is _____ pm.
   a) 205 b) 195
   c) 190 d) 200

6) Diborane appears just similar to _____.
   a) ethane b) butane
   c) borazine d) pentane

7) The process in which zinc is coated on Iron by hot dipping is known as _____.
   a) tinning b) galvanizing
   c) spraying d) corrosion

8) The exactly reverse of extraction process of metal is known as _____.
   a) passivity b) corrosion
   c) purification d) conduction

9) Structure of iron pentacarbonyl is _____.
   a) octahedral b) distorted octahedral
   c) trigonal bipyramidal d) tetraydral

10) Lithium alkyls are obtained by reaction of alkyl chloride with lithium metal in _____ solvent.
   a) inert b) aqueous
   c) non aqueous d) acidic

B) Fill in the blanks. **06**

1) The electronic configuration of 'Gd' is _____
2) Basicity of lathanones is _____ from La to Lu.
3) Superconductors shows _____ Effect.
4) In the formation of XeF_2 xenon shows _____ hybridization.
5) The term passivity was described in 1836 by Scientist _____.
6) Mononuclear carbonyls are represented by general formula ____.

Q.2 Solve any EIGHT of the following: **16**

a) Give the names of minerals of lanthanides.
b) Mentions the names of methods used for separation of lanthanides.
c) What are the applications of superconductors?
d) Define the term metallic bond.
e) Draw the structure of P_4O_6.
f) Give the reason for Borazine is called as inorganic benzene.
g) Explain the atmospheric corrosion.
h) Give the application of Passivity.
i) Give any two reactions of synthesis of organolithium compounds.
j) Draw the structure of $Ni(CO)_4$.

Q.3 A) Attempt any TWO of the following: **10**

1) Explain heavy ion bombardment method to prepare TU elements.
2) Discuss the free electron theory of metallic bonding.
3) Describe the structure and bonding of borazine.

B) Describe the ion exchange method for separation of Lanthanides. **06**

Q.4 A) Attempt any TWO of the following: **08**

1) Describe the electronic configuration of lanthanides.
2) Discuss the properties of metallic solids.
3) Explain the structure of Sulphur dioxide.

B) What are the types of semiconductor? Explain the n- type of semiconductors. **08**

Q.5 Attempt any TWO of the following: **16**

a) Describe the structure and bonding of diborane.
b) Explain the methods used for protection of metal from corrosion.
c) Discuss the structure and bonding in alkyl beryllium compound.

SLR-DA-236

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XIV)
Plant Biotechnology (19201602)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculator is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) An enzyme _____ joins fragment of DNA.
   a) Ligase b) Restriction endonuclease
   c) Primase d) Exonuclease

2) Compositional properties of DNA analyzed by _____ technique.
   a) Southern blotting b) Northern blotting
   c) Western blotting d) PCR

3) PCR stands for _____.
   a) Polymerase chain reaction b) People's choice reaction
   c) Peptide chain reaction d) Polymorphic chain reaction

4) Micro injection is _____ method of gene transfer.
   a) Chemical b) Biological
   c) Physical d) None of above

5) In chemical method of gene transfer, _____ chemical is most commonly used.
   a) Agar b) Cellulose
   c) Sucrose d) Polyethylene glycol (PEG)

6) In gene cloning, transfer of gene from bacteria to recipient bacteria is called _____.
   a) transduction b) transformation
   c) conjugation d) reproduction

7) The technique used to identify specific DNA sequences in bacterial colonies is called _____.
   a) Colony hybridization b) In situ hybridization
   c) Dot blot technique d) Western blotting technique

8) Who is known as father of tissue culture?
   a) Watson and Crick b) Haberlandt
   c) Murashige and Skoog d) Mendel

9) Haploid plants can be obtained through _____ culture.
   a) anther b) bud
   c) leaf d) root

10) In tissue culture technique, the composition of M. S. media is _____.
   a) major and minor nutrient
   b) vitamins and growth regulators
   c) sugar
   d) All of the above

B) Fill in the blanks. **06**

1) Reverse transcriptase enzyme used in _____.
2) Bt cotton is _____ resistant plant.
3) Cosmid is used as _____.
4) Cell without cell wall is called _____.
5) Taq polymerase enzyme used in _____.
6) Nitrocellulose membrane used in _____ blotting technique.

Q.2 Solve any EIGHT of the following. **16**

a) Define tissue culture.
b) Enlist the enzymes used in recombinant DNA technology.
c) What is plasmid?
d) Draw neat labeled diagram of vector bacteriophage.
e) What is mean by transgenic plant?
f) Define gene cloning.
g) Write the names of any two transgenic plants.
h) What is mean by marker gene?
i) Define complementation.
j) Write any two applications of DNA finger printing.

Q.3 A) Attempt any TWO of the following. **10**

1) Give an account of role of biotechnology in agriculture.
2) Write a note on methods of sterilization in plant tissue culture.
3) Describe the process of southern blotting technique.

B) Write a short note on Polymerase chain reaction. **06**

Q.4 A) Attempt any TWO of the following. **08**

1) Explain in brief colony hybridization.
2) Summarize the process of DNA fingerprinting.
3) Write a note on micropropagation.

B) Explain the process of Somatic hybridization with its significance. **08**

Q.5 Attempt any TWO of the following. **16**

a) Write a brief note on any two biotechnological institutes studied by you.

b) Describe the technique of plant tissue culture.

c) Explain in brief biological method of gene transfer.

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Special Paper - XIV)
Evolutionary Biology (19201628)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. 10

1) The use and disuse principal of evolution or theory of inheritance acquired characters was proposed by _____.
   a) Hugo de Vries b) Lamarck
   c) Weismann d) Darwin

2) Role of isolation in evolution is _____.
   a) Differentiation of a species b) Maintenance of species
   c) Evolution of species d) Extermination of species

3) The evolution of a species is based upon sum total of adaptive changes preserved by _____.
   a) Natural selection b) Isolation
   c) Speciation d) Human conservation

4) The unit of evolution is _____.
   a) Individual b) Species
   c) Population d) Social group

5) Elimination of Genes or alleles from a population is nothing but ____.
   a) Genetic load b) Gene migration
   c) Hybridization d) Genetic drift

6) The earliest geological time period among the following is _____.
   a) Cambrian b) Permian
   c) Jurassic d) Quaternary

7) Industrial melanism is a classical example of _____.
   a) Genetic drift b) Genetic load
   c) Natural selection d) Lamarckism

8) Species may define as _____.
   a) An Interbreeding population
   b) An self breeding population
   c) Group of analogous individuals
   d) Group of homologous individuals

9) Observation of species on _____ heavily inspired Darwin's theory of evolution.
   a) Ilha da Queimada Grande b) Guatemala
   c) Faroe Islands d) Galapagos Islands

10) The force that initiates evolution is _____.
   a) Variation b) Mutation
   c) Extinction d) Adaptation

B) Definition/One sentence answer: **06**

1) Define Chemogeny.
2) Define Organic Evolution.
3) What are the geological time scales?
4) Define variation.
5) Define Genetic drift.
6) Define Mutation.

Q.2 Solve any eight of the following **16**

a) Define globin gene family.
b) Macroevolution
c) Write the statement of Darwinism.
d) Universality of genetic code
e) Define Natural selection.
f) Define Adaptive radiation.
g) Write examples of heritable variation.
h) Define evolutionary forces.
i) Explain evolution of Eukaryotes.
j) Define Pseudo fossils.

Q.3 A) Answer the following (Any two) **10**

1) Explain sources of variation.
2) Write a short note on RNA world.
3) Define mass extinction.

B) Short note. **06**

Write a short note on types of fossils.

Q.4 A) Answer the following (Any two): **08**

1) Explain principles of Lamarckism.
2) Explain protein synthesizing machinery in molecular evolution.
3) What are the different modes of speciation?

B) Describe/Explain: **08**

Explain in detail various forces of speciation.

Q.5 Answer the following (Any Two). **16**

a) Explain K-T extinction its causes and effects with example.
b) Give a detailed account of evolution of horse.
c) Write statement and derivation of Hardy -Weinberg law and its application to human population.

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - XIV)
Numerical Analysis (19201636)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of 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) If $\left(E^{\frac{1}{2}} + E^{-\frac{1}{2}}\right)(1 + \Delta)^{\frac{1}{2}} =$ _____.
   a) $\Delta + 1$ b) $\Delta - 1$
   c) $\Delta + 2$ d) $\Delta - 2$

3) $\Delta \tan^{-1} x$ = _____.
   a) $\tan^{-1}\left\{\frac{h}{1 + hx + x^2}\right\}$ b) $\tan^{-1}\left\{\frac{h^2}{1 + hx + x^2}\right\}$
   c) $\tan^{-1}\left\{\frac{h}{1 - hx + x^2}\right\}$ d) $\tan^{-1}\left\{\frac{h}{1 + hx - x^2}\right\}$

4) The solution of $u_{n+2} - 2u_{n+1} + u_n = 0$ is _____.
   a) $u_n = c_1 + c_2 n^2$ b) $u_n = c_1 - c_2 n$
   c) $u_n = c_1 + c_2 n$ d) $u_n = c_1 + c_2 n + c_3 n^2$

5) The P.I. of $y_{n+2} - 5y_{n+1} - 6y_n = 2^n$ is _____.
   a) $-\frac{1}{12} 2^n$ b) $\frac{2^n}{12}$
   c) $\frac{1}{144} 2^n$ d) $\frac{12}{2^n}$

6) The order of difference equation $y_{n+2} - 2y_n + y_{n-1} = 1$ is _____.
   a) 1 b) 2
   c) 4 d) 3

7) The exact value of $\int_0^1 \frac{dx}{1 + x}$ is = _____.
   a) 0.96315 b) 0.63915
   c) 0.69315 d) 0.69351

8) In Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule, the function $y = f(x)$ is taken to be _____.
   a) Parabola b) Straight line
   c) Circle d) Ellipse

9) The Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule obtained by $n =$_____ in general quadrature formula.
   a) 1 b) 3
   c) 2 d) 4

10) 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 dependent variable
   c) Intermediate value of constant
   d) Both b) and c)

B) Fill in the blanks. **06**

1) The solution of $u_{n+2} - 7u_{n+1} + 10\,u_n = 0$ is _____.
2) If $\lambda_1, \lambda_2, \lambda_3$ are real and distinct roots then C. F.= _____.
3) The value of $\left(\frac{\Delta^2}{E}\right) e^x =$ _____.
4) The relationship between the operators E and D is _____.
5) If $\int_0^4 e^x\,dx$ dividing the integral 0 to 4 in to four parts and width is 1 then $y_4 =$ _____.
6) The Lagrange's interpolation formula for unequal intervals for n points is polynomial of degree _____.

Q.2 Attempt any eight of the followings. **16**

a) Prove that $\nabla = 1 - E^{-1}$
b) Prove that $\Delta = E\nabla = \nabla E$
c) State the Newton's backward interpolation formula.
d) Solve $u_{n+3} - 2u_{n+2} - 5u_{n+1} + 6u_n = 0$
e) Solve $u_{n+2} - 4u_{n+1} + 4u_n = 2^n$
f) Form $y_n = A2^n + B(-3)^n$, derive the difference equation by eliminating the constants.
g) State the Trapezoidal rule for integration.
h) State the Gauss's forward interpolation formula.
i) With usual notation, prove that $h\mathrm{D} = \log(1 + \Delta) = -\log(1 - \nabla)$
j) State Newton-Cotes quadrature formula.

Q.3 A) Attempt any two of the followings. **10**

1) Given that

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 $\frac{dy}{dx}$ at $x = 1.1$

2) Find the cubic polynomial which takes the following values.

x :	0	1	2	3
$f(x)$:	1	2	1	10

Hence or otherwise evaluate $f(4)$

3) With usual notations, prove that

i) $\mu = \frac{1}{2}\left(E^{\frac{1}{2}} + E^{-\frac{1}{2}}\right)$

ii) $\Delta - \nabla = \Delta\nabla = \delta^2$

B) Solve **06**

i) $y_{n+2} - 4y_{n+1} + 3y_n = 5^n$

ii) $y_{x+1} - y_x + xy_{x+1}\, y_x = 0$ given that $y_1 = 2$

Q.4 A) Attempt any two of the followings. **08**

1) Prove that $1 + \delta^2\mu^2 = \left(1 + \frac{1}{2}\delta^2\right)^2$

2) Solve

i) $y_{n+2} - 2y_{n+1} + y_n = n^2 2^n$

ii) $y_{x+1}^2 - 3y_{x+1}\, y_x + 2y_x^2 = 0$

3) Find the value of $\cos(1.74)$ from the following table.

x:	1.7	1.74	1.78	1.82	1.86
$\sin(x)$:	0.9916	0.9857	0.9781	0.9691	0.9584

B) State and prove Newton's forward interpolation formula. **08**

Q.5 Attempt any two of the followings. **16**

a) State and prove Simpson's $\left(\frac{3}{8}\right)^{\text{th}}$ rule and hence evaluate $\int_0^6 \frac{dx}{1+x^2}$

b) State and prove Lagrange's formula for unequal intervals.

c) Evaluate

1) $\Delta\left(\frac{x^2}{\cos 2x}\right)$

2) a) $\Delta^2(ab^x)$

b) $\Delta\,(e^x \log 2x)$

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - XIV)
Probability Theory (19201644)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Use of calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) If $Y_1 < Y_2 < ... < Y_n$ is an order statistic from a distribution with pdf f(x) and CDF F(X) then probability distribution of Y_r can be obtained using _____.
   a) Concept of multinomial distribution
   b) Concept of first definition of derivative
   c) Both a and b
   d) Neither a nor b

2) Distribution of _____ can be obtained using order statistics.
   a) mean b) variance
   c) summation of X_i d) none of these

3) Let $\{X_n, n \geq 1\}$ be a sequence of iid r.vs. each with mean μ and variance σ^2. Let $S_n = \sum_{i=1}^{n} X_i$ Then the limiting distribution of Z is normal if Z =
   a) $\frac{S_n - \mu}{\left(\sigma/\sqrt{n}\right)}$ b) $\frac{S_n - n\mu}{\left(\sigma/\sqrt{n}\right)}$
   c) $\frac{S_n - n\mu}{n\sigma^2}$ d) $\frac{S_n - n\mu}{\sigma\sqrt{n}}$

4) If $X_n \xrightarrow{P} X$ then _____.
   a) $KX_n \xrightarrow{P} KX$ b) $KX_n \xrightarrow{P} K$
   c) $KX_n \xrightarrow{P} X$ d) None of these

5) Convergence in probability of sample mean to population mean is implied by _____.
   a) C.L.T. b) Weak law of large numbers
   c) Chebyshev's inequality d) None of these

6) We say that state i leads to state j if _____.
   a) $P_{ij}^{(n)} \geq 0$ b) $P_{ij}^{(n)} = 0$
   c) $P_{ij}^{(n)} > 0$ d) None of these

7) Which of the following is not a Stochastic matrix?
   a) $P = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ b) $P = \begin{bmatrix} 1/2 & 1/2 & 0 \\ 1/3 & 1/3 & 1/3 \\ 1/3 & 0 & 2/3 \end{bmatrix}$
   c) $P = \begin{bmatrix} 1/2 & 2/3 & 0 \\ 1/2 & 1/2 & 0 \\ 0 & 1/3 & 2/3 \end{bmatrix}$ d) $P = \begin{bmatrix} 1/6 & 1/3 & 1/2 \\ 1/4 & 1/5 & 1/2 \\ 1/6 & 1/2 & 1/3 \end{bmatrix}$

8) A stochastic matrix _____.
   a) Row sums are unity b) Column sums are unity
   c) Both (a) and (b) d) neither (a) nor (b)

9) In $\mathrm{M/M/1 : \infty/FCFS}$ model the queue discipline is _____.
   a) first in last out b) first in first out
   c) last in first out d) last in last out

10) In $\mathrm{M/M/1 : \infty/FIFO}$ model the probability that the server is busy is _____.
   a) ρ b) $1 - \rho$
   c) $\frac{1}{\rho}$ d) $1 - \frac{1}{\rho}$

B) Fill in the blank **06**

1) In usual notations CDF of first order statistic is given by _____.
2) While deriving the p.d.f. of k^{th} order statistics we use concept of _____ distribution.
3) If Y_n follows B(n,p) then proportion of success to the number of trials Y_n/n converges to _____ in probability as $n \to \infty$
4) Transient state is also called as _____.
5) If $\rho = 5$ queue length will be _____.
6) If the customer leaves the queue when he finds that the queue is too long then it is called _____.

Q.2 Solve any Eight of the following. **16**

a) In usual notations state the p.d.f of r^{th} order statistic.

b) Find the c.d.f of n^{th} order statistic.

c) Let $X_1, X_2, \ldots, X_n$ 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 largest order statistic.

d) State the necessary and sufficient condition for existence of W.L.L.N.

e) Define convergence in distribution.

f) Define.

i) Transient state

ii) Persistent state

g) Suppose one step TPM is

$$P = \begin{bmatrix} 0.7 & 0.3 \\ 0.4 & 0.6 \end{bmatrix}$$

construct two step TPM.

h) Define accessible state and communicating state of Markov chain.

i) Write any two operating characteristic in queuing system.

j) Write on service mechanism in queuing theory.

Q.3 A) Solve any two of the following **10**

1) Let $X_{(1)}, X_{(2)}, X_{(3)}, X_{(4)}$ be the order statistic of a random sample of size 4 drawn from the distribution having p.d.f.

$$f(x) = \begin{cases} e^{-x} & , 0 < x < \infty \\ 0 & , o.w \end{cases}$$

Find $P(X_{(4)} \geq 3)$

2) Let $x_1, x_2, x_3, \ldots \ldots \ldots x_n$, be a sequence of r.v. with mean μ and variance σ^2 then show that $\frac{S_n}{n} \xrightarrow{2} \mu$, where

$S_n = x_1 + x_2 + x_3 + \cdots \cdots x_n$

3) Let $\{X_n, n \geq 1\}$ be a Markov chain with states space $\{0, 1, 2\}$ and one step TPM.

$$P = \begin{bmatrix} 0.1 & 0.5 & 0.4 \\ 0.6 & 0.2 & 0.2 \\ 0.3 & 0.4 & 0.3 \end{bmatrix}$$

and initial probability distribution $P[X_0 = i] = 1/3,\ i = 0, 1, 2$

Find

i) $(X_2 = 2/X_1 = 1)$

ii) $P(X_2 = 2, X_1 = 1/X_0 = 2)$

iii) $P(X_2 = 2, X_1 = 1, X_0 = 2)$

B) One customer arrives at a counter in a bank after every 15 minutes. Staff on the counter takes 10 minutes on an average for serving a customer. Under the assumptions for applying $\mathrm{M/M/1:\infty/FCFS}$ model, find **06**

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 $i.i.d.B(1,p)$ then show that WLLN holds good for this sequence $\{X_n\}$
2) Obtain stationary probability distribution of Markov chain with TPM

$$P = \begin{bmatrix} \frac{2}{3} & \frac{1}{3} \\ \frac{1}{2} & \frac{1}{2} \end{bmatrix}$$

3) For queuing model $\mathrm{M/M/1:(\infty/FCFS)}$ with usual notation find the probability that queue size being greater than or equal to k.

B) If $X_n \xrightarrow{p} X$ and $Y_n \xrightarrow{p} Y$ as $n \to \infty$ than show that $X_n + Y_n \xrightarrow{p} X + Y$ as $n \to \infty$ also show that $X_n - Y_n \xrightarrow{p} X - Y$ as $n \to \infty$. **08**

Q.5 Answer the following. (Any Two) **16**

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.

$P = \begin{bmatrix} 0 & 1 & 0 \\ p & 0 & q \\ 0 & 1 & 0 \end{bmatrix}$ 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 is expected length of the system?
4) What would be average waiting time in the queue?

SLR-DA-240

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper- XIV)
Geomorphology and Geotectonics (19201653)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.

Q.1 A) Choose the correct alternatives from the options. **10**

1) Rejuvenation can be interpreted by presence of _____.
   a) point bar b) meandering
   c) entrenched meander d) delta

2) Which of the following is “Trio” of Davis?
   a) structure – process – time b) lithology – process – time
   c) scale – process – time d) structure – process – scale

3) Landforms of mesa and butte are formed on _____ structure.
   a) Granitic batholiths
   b) Horizontal lava flows or sedimentary beds
   c) Folded and faulted region
   d) Limestone region

4) The level below which river cannot erode vertically downward is also called as _____.
   a) lower level of erosion b) upper level of erosion
   c) regional level d) base level of erosion

5) Knick point can be indicated by presence of _____.
   a) water fall b) meandering
   c) delta d) None of these

6) What clue supported the continental drift theory?
   a) Fossils of animals have been found on continents separated by oceans
   b) a puzzle-like fit of all the continents
   c) Similar rock structures have been found on different continents
   d) all answers are correct

7) Which of the following is associated with a divergent plate boundary?
   a) Ridge b) Trench
   c) Island arc d) Accretionary prism

8) The removal of particles of dust and sand by strong winds is called _____.
   a) Abrasion b) Depletion
   c) Deflation d) Aeration

9) The variously shaped depressions of different dimensions that are developed in the riverbed are called _____.
   a) Potholes b) Cavities
   c) Dents d) Craters

10) Which of the following agents of erosion deposits the most poorly sorted sediment?
   a) Wind b) Ice
   c) Streams d) ocean currents

B) Answer the following questions in one sentence. **06**

1) Name the exogenetic processes.
2) What causes of static rejuvenation?
3) In which stage of erosion cycle, delta occurs?
4) What is Panthalassa?
5) Name the ocean present during Gondwana land.
6) What is traction?

Q.2 Answer the followings (Any Eight): **16**

a) What is lithosphere?
b) What is ventifact?
c) What is the shape of valley formed by glacier?
d) Where trenches occur?
e) What is sink hole?
f) What is pacific ring of fire?
g) What is degradation?
h) What is stack?
i) What is the term when Plates slide past one another horizontally?
j) What is the name of the earth's layer where convection currents are operating?

Q.3 A) Answer the following (Any two): **10**

1) Transportation by wind
2) Describe any five characters of plates
3) Subduction zone

B) Explain the term 'Uniformitarianism'. **06**

Q.4 A) Answer the following (Any two): **08**

1) Fluvial erosional features
2) Island arc
3) Eustatic rejuvenation

B) Mid-Oceanic Ridges **08**

Q.5 Answer the following (Any Two). **16**

a) Describe in detail erosional features formed by the work of ocean.

b) Describe characters of youth, mature and old stages.

c) Explain, “Complexity of geomorphic evolution is more common than simplicity”.

SLR-DA-241

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - XIV)
Microbial Biochemistry (19201661)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculators are allowed.

Q.1 A) Choose the correct alternatives from the options. 10

1) The same reaction catalyzed by two or more different molecular forms of an enzyme. These multiple forms of enzyme is called as _____.
   a) Alloenzyme b) Coenzyme
   c) Isoenzyme d) Ribozyme

2) In specific acid base catalysis of enzyme catalysed reaction _____ acts as proton donor or acceptor.
   a) Water b) Organic solvent
   c) HCl d) H_2SO_4

3) The peptidyl transferase activity is present in _____ subunit of ribosome.
   a) 30S b) 70S
   c) 50S d) 40S

4) The regulatory enzymes for which substrate and modulator are different which is called as _____ co-operativity .
   a) Heterotropic b) Homotropic
   c) ping pong d) Double displacement

5) Disruption of microbial cells by exposing at freezing and at room temperature is called as _____.
   a) Ultrasonication b) Thawing
   c) Osmotic shock d) Homogenization

6) Induced fit hypothesis proposed by koshland is based on _____ phenomenon.
   a) Rigidity b) Confirmational change
   c) Stiffness d) Acidity

7) An epimerase enzyme in arabinose operon encoded by _____ structural gene.
   a) ara A b) ara D
   c) ara B d) ara I

8) In the assimilation of Sulphur, it is activated by adenylation using _____ enzyme to adenosine-5 phosphosulphate (APS).
   a) ATP sulphurylase b) APS kinase
   c) PAPS reductase d) PAPS kinase

9) The Phosphoketolase enzyme in the pathway cleaves pentose phosphate into _____.
   a) glyceraldehyde-3-phosphate
   b) acetyl phosphate
   c) Both a & b
   d) Ribose-5 Phosphate

10) The ability of microorganism to produce or emit the light in the presence of oxygen is called as _____.
   a) Bioluminescence b) Magniluminescence
   c) Phosphorescence d) Radiofluroscence

B) Define the following: **06**

1) Coenzyme
2) Active site
3) Enzyme activity
4) Bioluminescence
5) Ribozymes
6) Enlist the names of purines and pyrimidines

Q.2 Solve any eight of the following: **16**

a) Lock and key hypothesis
b) Define activation energy.
c) Give the significance of Vmax and Km.
d) What is isozyme? Enlist the example.
e) Define immobilization.
f) Induced fit hypothesis
g) Explain the principle of affinity chromatography.
h) What is GOGAT?
i) What is catabolite repression?
j) Explain cell disruption by liquid shear.

Q.3 A) Answer the following (Any two): **10**

1) Explain in detail Glyoxylate bypass.
2) What is inducible operon? Explain in brief arabinose operon.
3) Explain in brief assimilation of carbon by Calvin cycle.

B) Explain in detail the methods of enzyme immobilization. **06**

Q.4 A) Answer the following (Any two): **08**

1) Explain in detail tryptophan operon.
2) Give a brief account on peptidoglycan biosynthesis.
3) Describe in brief mechanism of bioluminescence.

B) What is protein synthesis? Discuss in detail protein synthesis. **08**

Q.5 Answer the following (Any Two) **16**

a) What is allosteric enzyme? Explain in details models explaining mechanism of action.

b) Describe in detail ED Pathway.

c) Give a detailed account on purification of enzyme on the basis of solubility, molecular size and electric charge.

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Special Paper - XIV)
Embedded System Design (19201677)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives from the options. **10**

1) Which one of these is an embedded product?
   a) Mouse b) Keyboard
   c) TV remote d) all of these

2) The main component of an embedded system is _____.
   a) Memory b) Application specific circuitry
   c) Microcontroller d) Communication interface

3) In uC89C51, the hardware RESET initializes the program counter to Address _____.
   a) 0000 b) FFFF
   c) 0013 d) 001B

4) C language is called _____ level language.
   a) assembly b) high
   c) middle d) machine

5) Which one of these is not a C keyword?
   a) Continue b) Break
   c) When d) Switch

6) Which one of these statements in C is a loop control statement?
   a) if b) if-else
   c) switch-case d) while

7) The data type used for addressing bit addressable RAM bit is ____.
   a) sbit b) bit
   c) sfr d) int

8) The header file required for writing an embedded C program for uC 8051 family is _____.
   a) std51.h b) 8051.h
   c) reg51.h d) uC51.h

9) Which one of these is an 8-bit code to turn-on and off alternate LEDs connected to the 8-bit parallel port?
   a) 00 - FF b) AA - 55
   c) 01 - 10 d) 0F - F0

10) To display alphanumeric data on LCD, the data is sent in _____ format.
   a) ASCII b) BCD
   c) 7-Segment d) alpha-numeric

B) Fill in the blank/Definition/One sentence answer/one word answer **06**

1) The size of float data type is _____ bytes.
2) A microcontroller-based, software driven, reliable and real-time system, operating on diverse physical variables in diverse environment at a lesser cost is called _____ system.
3) If the a-b-c-d-e-f-g segments of common-anode seven segment display are connected to port pins P1.0 to P1.6 (Pin P1.7 unused), the HEX code for displaying numeric 4 will be _____.
4) The delimiter “Curley Braces { }” is used in C-programs for _____.
5) The operator “|” is used in embedded-C for _____.
6) Which port of uC89C51 is a purely input/output port?

Q.2 Answer the following (Any Eight): **16**

a) Name any four applications of an embedded system.
b) How manual RESET is different from power-on RESET?
c) Explain the role of ANSI-C in short.
d) What is local variable Declaration in C programming?
e) Give the concept of Super-loop and the command used to achieve it.
f) Write the embedded C instructions to declare Port-1 as output port and Port-2 as input port.
g) Give the basic principle of speed control of DC motor using PWM technique.
h) Pin diagram of LM-35.
i) Explain the role of reg51.h header files in C programming.
j) What is difference between C and Embedded-C?

Q.3 A) Answer the following (Any two): **10**

1) Write a C program to illustrate the use of one dimensional array.
2) Explain the interfacing of seven segment display and write appropriate C program to drive the display.
3) Discuss various applications of an embedded system.

B) Explain the architecture of an Embedded System. **06**

Q.4 A) Answer the following (Any two): **08**

1) Explain the use of switch-case statement in C.
2) Discuss various logical operators in embedded-C.
3) Explain the interfacing of Thumb-wheel switch.

B) Design 89C51 based embedded system for measurement of relative humidity. **08**

Q.5 Answer the following (Any Two). **16**

a) Explain the interfacing of ADC-0804 to uC 89C51 and hence write C-program to read the ADC and send the data to port-1.

b) Design uC 89C51 based embedded system for speed control of DC motor using PWM technique.

c) Write an embedded-C program to generate a square wave of 5 KHz on port pin P1.0, using timers.

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper- XV)
Advanced Java (19201669)

Day & Date: Wednesday, 22-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternatives from the options. **10**

1) Which one of the following is correct for directive in JSP?
   a) <%@directive%> b) <%!directive%>
   c) <%directive%> d) <%=directive%>

2) Which of the following action variable is used to include a file in JSP?
   a) jsp:setProperty b) jsp:getProperty
   c) jsp:include d) jsp:plugin

3) Java code is embedded under which tag in JSP?
   a) Declaration b) Scriptlet
   c) Expression d) Comment

4) What type of servlets uses doGet(), doPost(),doHead, doDelete(),doTrace() methods?
   a) GenericServlet b) HttpServlet
   c) HttpSession d) None of these

5) What is javax.servlet.Servlet?
   a) Interface b) abstract class
   c) concreate class d) None of the above

6) A servlet maintain session in _____.
   a) Servlet Context b) Servlet container
   c) Servlet response heap d) Servlet request heap

7) Which of the following code is used to get an attribute in a HTTP Session object in servlets?
   a) session.getAttribute(String name)
   b) session.alterAttribute(String name)
   c) session.updateAttribute(String name)
   d) session.setAttribute(String name)

8) Which object of HttpSession can be used to view and manipulate information about a session?
   a) session identifier b) creation time
   c) last accessed time d) All the above

9) Which methods are used to bind the objects on HttpSession instance and get the objects?
   a) setAttribute b) getAttribute
   c) Both a & b d) None of the above

10) Which of the following method is static and synchronized in JDBC API?
   a) getConnection() b) prepareCall()
   c) executeUpdate() d) executeQuery()

B) Fill in the blank. **06**

1) Parameterized queries can be executed by _____.
2) The Java _____ specification defines an application programming interface For communication between the Web server and the application program.
3) _____ cookie it is valid for single session only and it is removed each time when the user closes the browser.
4) JSP stands for _____.
5) JSTL stands for _____
6) Session object holds the _____.

Q.2 Solve any eight of the following: **16**

a) What is JDBC?
b) What are the JDBC statements?
c) What are Use of RequestDispatcher in servlet?
d) What is pageContext in JSP?
e) Explain simple tag in JSP?
f) What are struts?
g) What is mean by Cookies?
h) What is mean by Hibernate?
i) Explain HttpSession in servlet?
j) Write use Bean tag in JSP?

Q.3 A) Answer the following (Any two): **10**

1) Explain the different steps within life cycle of servlet.
2) Write a Servlet program for handling cookies.
3) Explain Component and features of JDBC.

B) Short note on **06**

1) GenericServlet
2) HttpServlet

Q.4 A) Answer the following (Any two): **08**

1) What are the steps to connect to the database in java?
2) Explain Features of Struts?
3) Explain the use CallableStatement with example.

B) Explain JDBC Architecture with Types of Divers. **08**

Q.5 Answer the following (Any Two). **16**

a) What is Session? Explain Session tracking mechanism in servlet?

b) Explain Architecture of Hibernate in detail.

c) What is mean by Java Bean? Explain Advantages and Disadvantages of Java Bean?

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - XVI)
Atomic, Molecular Physics and Quantum Mechanics (19201621)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Select the correct alternative from the following. 10

1) The transition from nS levels to the lowest P level give rise to the series of spectral lines is called _____.
   a) sharp b) principal
   c) diffuse d) fundamental

2) m_j can have only _____ values from $-j$ to $+j$, excluding zero.
   a) $j(j+1)$ b) $2j+1$
   c) $\sqrt{j(j+1)}$ d) $\sqrt{(2j+1)}$

3) If the coupling between $\ell^*$and s^* is not broken in an external magnetic field, then we observe _____.
   a) normal Zeeman effect b) anomalous Zeeman effect
   c) Paschen-back effect d) Stark effect

4) The ratio of magnetic moment to the mechanical moment of orbital motion of electron is _____.
   a) $e/2m$ b) $2\ e/2m$
   c) e/m d) $2e/m$

5) Frank-Condon principle helps in estimating the _____.
   a) width of bands b) intensity of bands
   c) intermolecular distance d) band region

6) If P is the momentum of the particle and k is the propagation constant of the wave, then the De—Broglie's relation is _____.
   a) $p = \hbar k$ b) $p = \hbar/k$
   c) $p = \hbar w$ d) $p = k/\hbar$

7) The quantity $\Psi\Psi^*$is called _____.
   a) probability current density b) reflection coefficient
   c) transmission coefficient d) probability density

8) The separation between two successive energy levels in harmonic oscillator is _____.
   a) $\hbar\omega$ b) $\hbar\omega/_2$
   c) $3/2\ \hbar\omega$ d) $2/3\ \hbar\omega$

9) The energy spectrum of particle in one - dimensional rigid box has the nature of _____.
   a) infinite sequence of discrete energy levels
   b) infinite sequence of equidistant energy levels
   c) exponential increasing
   d) exponential decreasing

10) The Z component of angular momentum operator is given by $L_z =$ _____.
   a) $i\hbar\ \partial/\partial\phi$ b) $m\hbar$
   c) $i\hbar\ \partial/\partial\theta$ d) $-i\hbar\ \partial/\partial\phi$

B) Fill in the blanks. **06**

1) In the alkali spectra, the selection rule for j in emission transition is _____.
2) Good quantum numbers in Paschen- Back effect are _____.
3) The effect of external field on spectral line is known as _____.
4) Pure rotational spectra occurs in _____.
5) Raman shift occurs in _____.
6) Reduced Plank's constant is _____.

Q.2 Solve any Eight of the following. **16**

a) State Heisenberg's uncertainty principle.
b) Give any two properties of Raman lines.
c) What is an operator?
d) What is Stark effect?
e) Find eigen value of (sinnx) for operator d^2/d^2x.
f) Define Raman effect., Stoke's line and antistoke's line.
g) Calculate the reduced mass of CO diatomic molecule.
[Mass of $C = 1.99x10^{-26}$kg & Mass of O $= 2.66x10^{26}$kg]
h) State Probability density.
i) What is an commutation rule?
j) Find eigen value of (sinnx) for operator d^2/d^2x.

Q.3 A) Attempt any Two of the following. **10**

1) Obtain Zero point energy in case of linear harmonic oscillator from Heisenberg's uncertainty principle.
2) Derive the expression for vibrational energy levels of diatomic molecule.
3) The Raman exciting line in an experiment is 4358 A^0. A sample gives Stoke's line at 4458 A^0. Deduce the wavelength of anti-Stoke's line.

B) What is the Paschen Back effect? Obtain an expression for term value. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Show that $[\hat{H}, \hat{P}] = 0$.
2) State all quantum numbers.
3) State and express Ladder operator.

B) Using the steady state Schrodinger's wave equation, derive the energy eigen values and normalization condition for the motion of particle in one dimensional rigid box. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain anomalous Zeeman effect and obtain an expression for term shift.

b) Solve Schrodinger's equation for hydrogen atom and discuss the radial wave equation.

c) Derive Schrodinger's time dependent wave equation in three dimension.

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Special Paper - XV)
Organic Chemistry (19201612)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternatives for each of the options. **10**

1) Pyrrole is _____ in nature.
   a) Acidic b) Basic
   c) Amphoteric d) Neutral

2) Adrenaline is a derivatives of _____.
   a) Catechol b) Resorcinol
   c) Quinol d) Aniline

3) Orange IV dye is prepared from _____.
   a) Sulphanilic acid b) Benzaldehyde
   c) Picnic acid d) 5-amino salicylic acid

4) Mutarotation is catalyzed by _____.
   a) Acid b) Base
   c) Acid & base d) None of these

5) _____drug are used as an sedative & hypnotics.
   a) Tolbutamide b) Ibuprofen
   c) Phenobarbitone d) Chloromycetin

6) The polysaccharides are also known as _____.
   a) Sugar
   b) Non-sugar
   c) Water soluble carbohydrates
   d) None of these

7) Heterocyclic compound containing nitrogen are named using prefix _____.
   a) Oxa b) Thia
   c) Aza d) Phospha

8) The chemical nature of Vitamin-A is _____.
   a) Primary alcohol b) Secondary alcohol
   c) Tertiary alcohol d) Aldehyde

9) _____ stimulates the latex production in rubber trees.
   a) Ethophan b) Monocrotophos
   c) Methoxychlor d) Carbaryl

10) Chlorambucil is an _____ drug.
   a) Antidiabetics b) Anti-convulsant
   c) Antibiotic d) Anticancer

B) Fill in the blanks. **06**

1) Phenobarbitone is used as _____ drugs.
2) The compound containing the chromophoric groups are known as ____.
3) Ethambutol is used as _____ agents.
4) The Ozonolysis of Vitamin-A gives _____.
5) Ketohexose is ketone carbohydrates having _____ carbon atom.
6) When mixtures of furan, ammonia & steam is passed over heated alumina forms _____.

Q.2 Solve any eight of the following. **16**

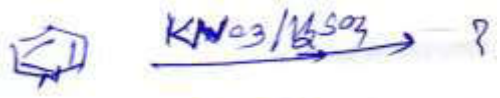
a) What is the action of
   1) SO_3 / H_2SO_4 at 220^0c
   2) Na/NH_3 on quinidine

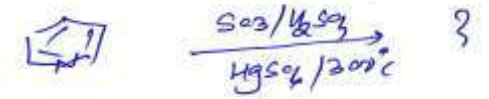
b) Draw the structure of sucrose.
c) Give any two qualities of good dye.
d) Write the structure of penicillin-G.
e) How will you convert glucose into fructose?
f) Prove the presence of five double bond in Vitamin-A.
g) Define Antimalarial & Antiviral agents.
h) What happens when adrenaline is fused with KOH?
i) Give synthesis of Brufen.
j) Define the term Pyrethroids & Fungicides.

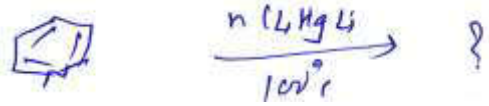
Q.3 A) Attempt any Two of the following. **10**

1) What are agrochemicals? Give synthesis and uses of Indole 3-Acetic Acid.
2) Write note on Kiliani's synthesis.
3) How is pyridine synthesized from acetylene & hydrogen cyanide?

Complete following chemical reactions.

i) 

ii) 

iii) 

B) Discuss structure of Thyroxine on the basis of analytical ground. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Discuss Skraup's synthesis of Quinoline.
2) Explain:
   i) Vat dye
   ii) Mordant dye
3) Give synthesis of Methoxychlor & Carbaryl.

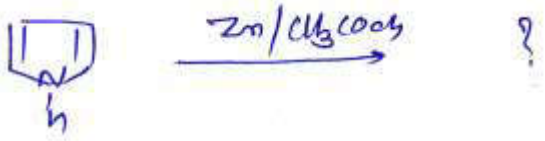
B) What are carbohydrates? Prove that open chain structure of glucose on analytical basis. **08**

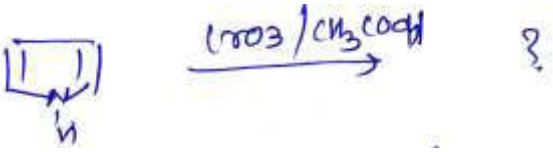
Q.5 Attempt any Two of the following. **16**

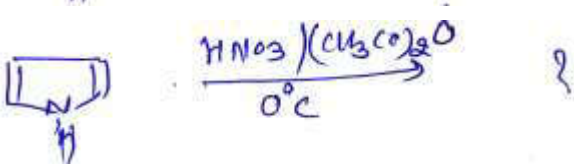
a) What are antibiotics? Give the synthesis of chloromycetin. Give its uses.

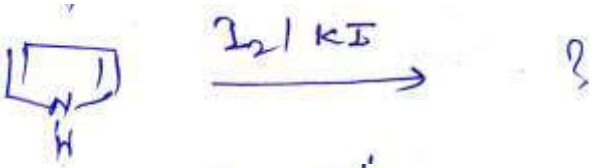
b) What are dyes? Explain Witt's theory of chromophore & auxochrome. Give synthesis of phenolphthalein.

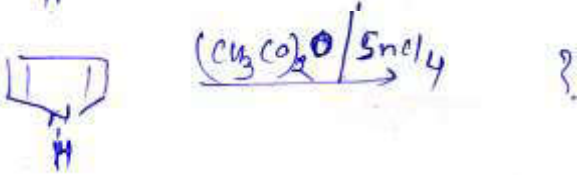
c) Give any two methods of preparation of pyrrole.
Complete the following reaction with pyrrole.

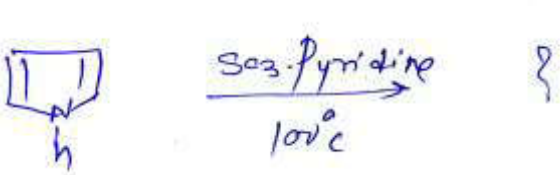
1) 

2) 

3) 

4) 

5) 

6) 

SLR-DA-246

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XV)
Cell Biology (19201603)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagram wherever necessary.
3) Figure to right indicate full marks.
4) Use of Log tables and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) _____ part of the compound microscope helps in gathering and focusing light rays on the specimen to be viewed.
   a) Eye piece lens b) Condenser lens
   c) Objective lens d) Magnifying lens

2) _____ is absent in plant cell.
   a) Centriole b) large central vacuole
   c) Cell wall d) Plastid

3) The inner membrane of the mitochondria is folded inwards towards matrix to form _____.
   a) Cristae b) Mesosomes
   c) Olyoxysomes d) Phagosome

4) A Chromosome with very short arm and very long arm is called as _____.
   a) Acrocentric b) Metacentric
   c) Telocentric d) Sub- Metacentric

5) _____ structure is absent in eukaryotic cell.
   a) Nuclear envelop
   b) Well organized nucleus
   c) Membrane bound organelles
   d) Mesosomes

6) 1000 nanometers is equal to _____.
   a) 1 meter b) 1 centimeter
   c) 1 micrometer d) 1 milimeter

7) Chromatids of homologous chromosomes are also called as _____.
   a) Centromere b) Telomere
   c) Sister chromatids d) Non-sister chromatids

8) _____ is the longest phase of the cell cycle.
   a) Leptotene b) MPhase
   c) Interphase d) S phase

9) Best phase to observe shape, size and number of chromosome is _____.
   a) Metaphase b) Telophase
   c) Prophase d) Interphase

10) _____ microscope is used to visualize live cells.
   a) SEM b) TEM
   c) Phase Contrast microscope d) All of these

B) Answer in one sentence. **06**

1) Calculate the total magnification of microscope with objective lens of 45X and ocular lens of 10X.
2) What is cell?
3) Enlist the eukaryotic cell components.
4) Which are subunit of the eukaryotic 80s ribosomes?
5) Which microscope is used for unstained specimen?
6) Who coined the term meiosis?

Q.2 Solve eight of the following. **16**

a) What is acrocentric chromosome?
b) Which enzymes present in peroxisomes?
c) Write advantages of dark field microscope.
d) Define karyotype.
e) Write significance of meiosis.
f) Enumerate various types of light microscopy.
g) What is polytene chromosomes?
h) Why the lysosomes are known as suicidal bags?
i) What is cytoskeleton?
j) What is significance of a nucleus?

Q.3 A) Attempt any two of the following. **10**

1) Write Principles of microscopy.
2) Describe types of chromosome.
3) Describe prophase I stage of meiotic division.

B) Write a note on. **06**

Glyoxisomes

Q.4 A) Attempt any two of the following. **08**

1) Differentiate between prokaryotic cell and eukaryotic cell.
2) Draw neat labeled diagram of chloroplast.
3) Write sample preparation for light microscopy.

B) Describe the following question. **08**

Draw neat labeled diagram of eukaryotic cell. And describe its structure.

Q.5 Attempt any two of the following. **16**

a) Describe ultrastructure of Mitochondria.

b) Define Mitosis and describe stages of mitosis.

c) Describe the phase contrast microscopy.

SLR-DA-247

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Special Paper - XV)
Animal Behavior and Chronobiology (19201629)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.

Q.1 A) Multiple choice questions. **10**

1) Study of animal behavior is called as _____.
   a) Ethology b) Zoology
   c) Ecology d) Anthropology

2) What type of behavior is exhibited by a group of animal?
   a) Instinctive behavior b) Learned behavior
   c) Social behavior d) Economic behavior

3) The behavior of young following their mother is known as _____.
   a) Imprinting b) Innate behavior
   c) Mimicry d) Habituation

4) Which of the following scientist is most closely association with the concept of a sign stimulus?
   a) Darwin b) Morgan
   c) Romanes d) Tinbergen

5) Which of the following characteristics NOT a way that populations can evolve genetically?
   a) Mutation b) Natural selection
   c) Learning d) Gene flow

6) Non- reproductive sterile female in honey bee society are called _____.
   a) Queen b) Drone
   c) Worker d) All of these

7) Our sleep-wake cycle follows a _____ rhythm.
   a) infradian b) circadian
   c) circannual d) ultradian

8) Which gland play important role in biological clock?
   a) Pineal gland b) Salivary gland
   c) Liver d) Pancreas

9) Which is the mother hormone of chronobiology?
   a) Bile b) Melatonin
   c) Saliva d) Cholecystokinin

10) Chronotheraphy is mainly useful for proper maintain of _____.
   a) physiological pattern b) anatomical pattern
   c) histological pattern d) circadian pattern

B) Fill in the blanks. **06**

1) When an individual repeat the same pattern of behavior again and again it is called as _____.
2) Thigmotaxis response to _____.
3) Ivan Pavlov performed his classical conditioning experiment on _____ animal.
4) _____ biologist published the famous book sociobiology.
5) _____ is a form of social behavior where by one organism puts itself either at risk or personal disadvantage for the good of other members of the species.
6) Directional movement towards /away from the stimulus.

Q.2 Solve any eight of the following. **16**

a) Proximate behavior
b) Orthokinesis
c) Waggle dance in honey bee
d) Sexual dimorphism
e) Tidal rhythms
f) Lunar rhythms
g) Chronopharmacology
h) Male rivalry
i) Role of pheromones in communication
j) Asymmetry of sex

Q.3 A) Attempt any two of the following. **10**

1) Write a brief profile Ivan Pavlov's contributions in behavioral biology and significance of his work.
2) Give Instinct and learnt behaviors with suitable examples.
3) What is intersexual competition (female choice).

B) Short Notes. **06**

Explain characteristics of biological rhythms.

Q.4 A) Attempt any two of the following. **08**

1) Explain social behavior in honey bee.
2) Describe photoperiod and regulation of seasonal reproduction in vertebrates.
3) Explain role of melatonin in biological rhythms.

B) Explain Territorial behavior. **08**

Q.5 Attempt any two of the following. **16**

a) Describe chronotherapy.
b) Explain types of learning.
c) Describe adaptive significance of biological clock.

SLR-DA-248

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - XV)
Graph Theory (19201637)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Select the correct alternative for each of the following. **10**

1) In pseudo graph _____ are allowed.
   a) only loops
   b) only multiple edges
   c) both loops and multiple edges
   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) A vertex with zero in degree is called as _____.
   a) source b) sink
   c) initial vertex d) none of these

4) Repeated vertex is not allowed in _____.
   a) walk b) trail
   c) circuit d) path

5) Complete graph K_n is Eulerian if $n =$ _____.
   a) 2 b) 4
   c) 5 d) 6

6) A directed graph is called strongly connected if for any pair of vertices of the graph _____ of the pair are reachable from one another.
   a) both the vertices
   b) at least one of the vertex
   c) no vertices
   d) none of these

7) A tree with 'n' vertices has _____ edges.
   a) n b) $n+1$
   c) $n-1$ d) $2n$

8) A tree with _____ vertex is called a trivial tree.
   a) one b) two
   c) three d) four

9) The binary number $111_{(2)}$ is equivalent to decimal number _____.
   a) 7 b) 5
   c) 9 d) 11

10) The octal number $4206_{(8)}$ is equivalent to binary number _____.
   a) $100010000100_{(2)}$ b) $100010000110_{(2)}$
   c) $100010000111_{(2)}$ d) None of these

B) Give answer in one sentence. **06**

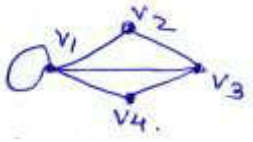
1) Convert $109_{(10)}$ to binary _____.
2) Draw a tree on four vertices.
3) Draw a graph of chemical molecules of methane.
4) Draw a Wheel W_4.
5) Draw a compete bipartite graph K_{24}.
6) Give an example of graph which contains an Eulerian circuit but not Hamiltonian cycle.

Q.2 Attempt any eight of the following. **16**

a) Convert $27{\cdot}A3C_{(16)}$ to binary.

b) Convert Decimal $0.78125_{(10)}$ to hexadecimal.

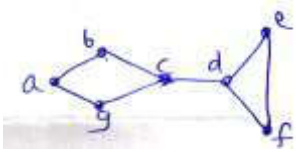
c) Find degree of each vertex.



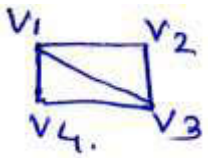
d) Define complete graph and give example.

e) Define cut vertex.

f) Find diameter of graph

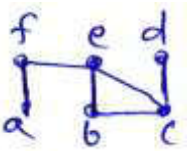


g) Write Adjacency matrix.



h) Show that the maximum number of edges in a simple graph with n vertices is $\frac{n(n-1)}{2}$

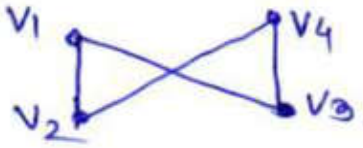
i) Find all spanning tree of graph



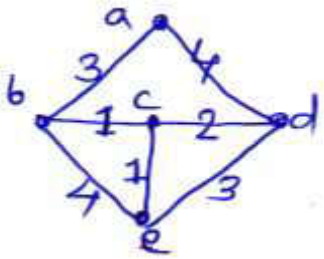
j) Draw binary tree represent of $(a+b) * \left({}^{c}/_{d}\right)$

Q.3 A) Attempt any two of the following. **10**

1) In non-directed graph show that total number of odd degree vertices is even.
2) Find number of walk of length 3 from v_3 to v_1 and also check the connectedness of the graph.



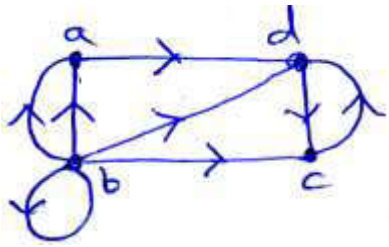
3) Find the minimal spanning tree of the weighted graph using Kruskal's algorithm.



B) i) Convert $39{\cdot}B8_{(16)}$ to decimal. **06**
ii) Convert $21{\cdot}673_{(8)}$ t Binary.

Q.4 A) Attempt any two of the following. **08**

1) Write short note on polish prefix and post fix notation.
2) Show that a simple graph with n vertices and k component can not have more than $\frac{(n-k)(n-k+1)}{2}$ edges.
3) Find indegree and out degree of following graph.

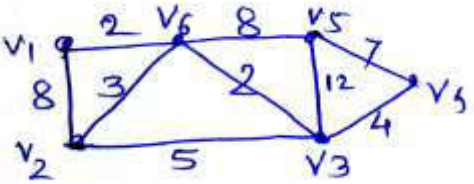


B) Convert **08**

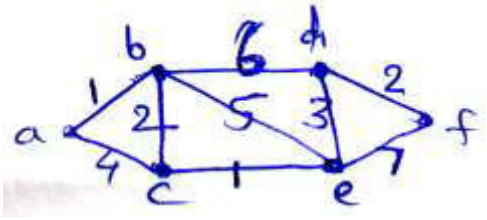
1) $110101 \cdot 1101_{(2)}$ to decimal
2) $13 \cdot 6825_{(10)}$ to binary
3) $3D59_{(16)}$ to binary
4) $97\ 19_{(10)}$ to hexadecimal

Q.5 Attempt any two of the following. **16**

a) Find the minimal spanning tree of the weighted graph using Prim's algorithm.

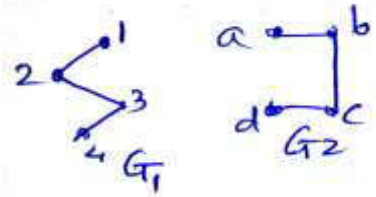


b) Apply Dijkstra's algorithm to the graph find the shortest path from 'a' to 'f'

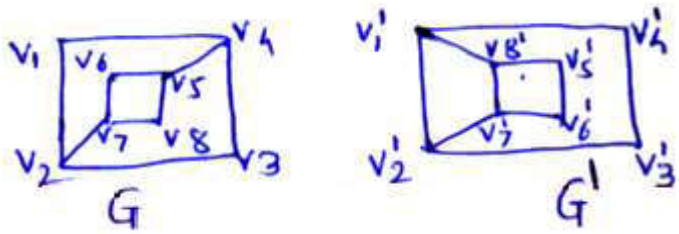


c) **Attempt the following.**

i) Show graph G_1 & G_2 are isomorphic.



ii) Show that graph G and G^1 is not isomorphic.



SLR-DA-249

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - XV)
Designs of Experiments (19201645)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Choose the correct alternatives of the following. **10**

1) In a factorial experiments _____.
   a) Testing one factor at a time
   b) Can not estimate interaction
   c) All possible combination of factor levels are tested
   d) All of the above

2) The total number of interaction effects in 2^3 factorial experiment is _____.
   a) 3 b) 4
   c) 5 d) 8

3) In RBD with 4 blocks and 5 treatments, the number of experimental units are _____.
   a) 16 b) 12
   c) 20 d) 19

4) In ANOCOVA the least square estimate of β = _____.
   a) Exx/Eyy b) Exy/Exx
   c) Eyy/Exy d) None of these

5) Error sum of squares in RBD as compared to CRD using the same material is _____.
   a) Less b) More
   c) Equal d) None of these

6) A Latin square design is _____ restrictional design.
   a) One b) Two
   c) Three d) Zero

7) The error degrees of freedom in LSD is 12. Hence degrees of freedom for treatment is _____.
   a) 2 b) 3
   c) 4 d) 5

8) An experimental unit in a research may be _____.
   a) An animal b) A field plot
   c) A group of insects d) All of the above

9) In 5×5 LSD, one observation is missing then d.f. for error s.s. is _____.
   a) 25 b) 24
   c) 12 d) 11

10) In CRD with 5 treatment and 10 experimental units, the treatment d.f. is equal to _____.
   a) 5 b) 4
   c) 9 d) 6

B) Attempt all of the following. **06**

1) State mathematical model of CRD.
2) State any one principle of experiment.
3) Define block.
4) Define yield.
5) Write full form of ANOVA.
6) State formula to find M.S.S.

Q.2 Attempt any eight of the following. **16**

a) Define main effects in 2^2 factorial experiment.
b) Define treatment and experimental unit.
c) Define Randomization.
d) Give real life situations of CRD.
e) Define Total Confounding.
f) State the formula to estimate one missing value in CRD.
g) State interaction effects in 2^3 factorial experiment.
h) Give the columns of ANOVA table.
i) Define layout of an experiment.
j) Define efficiency of design of experiment.

Q.3 A) Attempt any two of the following. **10**

1) Explain partial confounding with an example.
2) Describe the principle of local control.
3) Derive the formula for one missing observation in RBD.

B) Explain the procedure of testing of equality of two treatment means in CRD. **06**

Q.4 A) Attempt any two of the following. **08**

1) What is LSD? Give its layout.
2) Estimate the parameters in RBD
3) Give two merits of CRD

B) State the assumptions, the model used in ANOCOVA in CRD, also state the estimators of different parameters. **08**

Q.5 Attempt any two of the following. **16**

a) Explain Yate's procedure to obtain factorial effect to totals in 2^3 factorial experiment.

b) What is Randomized Block Design (RBD)? Give the layout and analysis of variance table for RBD.

c) Obtain the formula of estimating efficiency of RBD over CRD.

SLR-DA-250

Set No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper - XV)
Environmental Geology (19201654)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) In urban areas, what- can be solutions for flood problems?
   a) restoration of flood plains,
   b) channel cleaning and deepening,
   c) non-disposal of garbage in stream,
   d) all solutions as mentioned in a, b & c.

2) Fire is a common hazard in which disaster?
   a) Flood, b) Tsunami,
   c) Avalanche, d) Volcanic

3) Seasonally, which environmental problem is frequently experienced by Mumbai?
   a) Flood b) Cyclone
   c) Avalanche d) Subsidence

4) Where does the Latent Heat reside?
   a) Rain drop, b) Ice Crystal,
   c) Water Vapor, d) Sea Water

5) What is the effect of increase in Greenhouse gasses?
   a) siltation in the dam b) Tsunami
   c) Global Warming d) Subsidence

6) What is the effect of the removal of green cover in the catchment that may further lead to flooding?
   a) siltation in the dam b) Tsunami
   c) Global Warming d) subsidence

7) Industrialization is one of the major reasons for which effect?
   a) Cyclone b) Flood
   c) Global Warming d) Subsidence

8) Object, situation of, process that has potential to cause damage is?
   a) hazard b) disaster
   c) mitigation d) insecure

9) Which of the following may be caused due to war activities?
   a) landslides b) Tsunami
   c) Cyclone d) Volcano

10) What will be the effect of ash spread by major volcanic activities?
   a) tsunami causing flood
   b) earthquakes
   c) cracks & upliftment of ground
   d) reduced photosynthesis & probable drought

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. **06**

1) Define Retention Wall
2) Where is the place of catchment for the dam?
3) Where does the latent heat go when water vapor diffuses in the clouds?
4) Crystals of ice fall down from clouds is called as?
5) What term is used to describe precipitation in the Upper Himalayan region?
6) What will happen to the dam, if the green cover improves in the catchment area?

Q.2 Solve any Eight of the following. **16**

a) Give any two major causes of increased salinity of groundwater at the coastal areas?
b) What are the names of the ocean currents that mainly impact global precipitation?
c) What is a tropical environment like?
d) How much is the total energy that is not absorbed by the earth initially & is reflected back in the space?
e) What are the geographic locations of the solid state of the hydrosphere?
f) Which is the most important lithospheric content that supports plants & why?
g) What are the N95 & N100 the standard codes for?
h) What is causing the recession of snow-line in the Himalayas?
i) What is the ultimate effect of increased greenhouse gasses?
j) What was the name and type of the disaster that hit the west coast of India recently?

Q.3 A) Attempt any Two of the following. **10**

1) Define conventional energy. Describe its different subtypes.
2) Define non-conventional energy. Describe its subtypes.
3) Sketch and describe the Hydrogeological cycle.

B) Explain the nature of geological report for preparedness of probable flood. (Do not write non-geological explanation) **06**

Q.4 A) Attempt any Two of the following. **08**

1) Define flood. Describe two major causes of flood.
2) Define landslide. Describe symptoms of landslides.
3) Explain the process of subsidence in karst region.

B) Describe the solutions for the problems of flood. **08**

Q.5 Attempt any Two of the following. **16**

a) What is disaster management? Explain the preparedness phase of a Tsunami disaster.
b) Define lithosphere. Describe it in detail.
c) What is the global environmental condition at the equator of the earth? Add note on coastal and desertic environments of India.

SLR-DA-251

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - XV)
Clinical Microbiology (19201662)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labeled diagrams wherever necessary
3) Figures to the right indicate full marks
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct option and write the sentence. **10**

1) On blood agar Vibrio cholera shows _____ hemolysis.
   a) alpha b) beta
   c) gamma d) target

2) Rapid test for detection of Clostridium perfringens is _____.
   a) VDRL test b) Naglers reaction
   c) Kahn test d) Elisa test

3) Cigar bundle arrangement is observed with _____.
   a) *Mycobacterium leprae* b) *Vibrio cholera*
   c) *Helicobacter pylori* d) *Pseudomonas aeruginosa*

4) Oxidase test positive is a characteristic of _____ organisms.
   a) *Mycobacterium leprae* b) *Pseudomonas aeruginosa*
   c) *Helicobacter pylori* d) *Klebsiellapneumoniae*

5) Cerebral malaria is caused by _____.
   a) *Plasmodium falciparum* b) *Plasmodium malariae*
   c) *Plasmodium ovale* d) *Plasmodium vivax*

6) The cyst of Giardia lamblia contains _____ nuclei.
   a) two b) four
   c) three d) six

7) Which of the following Ebola virus species is not fatal among humans?
   a) Zaire b) Côte d'Ivoire
   c) Bundibugyo d) Reston

8) Swine flu is _____ disease.
   a) respiratory bacterial b) viral respiratory
   c) fungal d) protozoal

9) Hydrophobia is associated with _____ viral infections.
   a) Rabies b) Hepatitis
   c) Ebola d) Swine flu

10) Transmission of Ebola infection is through _____ of patient.
   a) blood b) saliva
   c) urine d) all of these

B) Answer the following questions in one sentence. **06**

1) Define chemotherapy.
2) What is hydrophobia?
3) Name the causative agent of swine flu.
4) Name any two antifungal agents.
5) what is attenuation?
6) Name the drugs used to treat AIDS.

Q.2 Answer the following questions. (Any Eight) **16**

a) Which pigments are produced by *Pseudomonas aeruginosa?*
b) Draw a labeled diagram of structure of Rabies virus.
c) What is cholera red reaction?
d) Name any two antifungal agents and their action.
e) What are toxoids?
f) What are the symtopms of swine flu?
g) What is pathogenicity?
h) What is subunit vaccine? Give one example.
i) What is dermatophycosis?
j) Draw a neat labeled diagram of Giardia lamblia.

Q.3 A) Write Short Notes (Any Two) **10**

1) Toxins produced by *Clostridium perfringens*
2) Bacterial toxins
3) Mechanism of drug resisitance

B) Write Short note on “bioweapons”. **06**

Q.4 A) Write Short Notes (Any Two) **08**

1) Live attenuated vaccines
2) Laboratory disposal of clinical samples and culture media
3) Cryptococcosis

B) Write the ideal characteristics of chemotherapeutic agents. Describe the mechanism of action of following antibiotics- penicillin, streptomycin, trimethoprim, quinolones **08**

Q.5 Attempt any Two of the following. **16**

a) Write an assay on “Ebola” with respect to following points-
1. causative agent 2. mode of transmission 3. symptoms 4. diagnosis 5. prophylaxis
b) Write an essay on “Leprosy”.
c) Describe in detail life cycle of malarial parasite.

SLR-DA-252

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Special Paper - XV)
Electronics Instrumentation (19201678)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to right indicate full marks.
4) Use of log tables and calculators is allowed.

Q.1 A) Multiple choice questions. **10**

1) The ____ techniques are used to eliminate noise or interference in the signal.
   a) Grounding b) electrostatic shielding
   c) electromagnetic shielding d) all of these

2) The signal conditioning systems are required to perform _____ process in all the measurement devices.
   a) Linear b) non-linear
   c) both a) and b) d) none of these

3) In case of DMM, to measure the value of unknown resistance the _____ source is utilized.
   a) constant voltage b) constant current
   c) variable voltage d) variable current

4) The _____ method is employed in magnetic tape recording.
   a) direct recording b) frequency modulation
   c) pulse code modulation d) all of these

5) In X-Y recorders, the self balancing potentiometers plot emf as a function of _____.
   a) Another emf b) Frequency
   c) Time d) Pressure

6) The Basic pH scale Ranges from _____.
   a) 7 to 10 b) 0 to 10
   c) 0 to 14 d) 7 to 14

7) The basic objectives of data acquisition system is _____.
   a) to acquire the data b) to process the data
   c) to provide human interface d) all of these

8) The CRO is electron beam _____.
   a) current meter b) Voltmeter
   c) op-amp non-inverting d) all of these

9) The standard glass pH electrode is of _____ electrode.
   a) Ampeometric b) Potentiometric
   c) variable capacitance d) variable resistance

10) In case of AD 620 Gain set with _____ external resistor with gain range 1 to 10,000.
   a) One b) Two
   c) Three d) Four

B) One sentence answer. **06**

1) What is recorder?
2) What is the use of LCR Q meter?
3) What are the advantages of digital multimeter?
4) What is the role of Isolation amplifiers?
5) Enlist the names of Display Unit.
6) Give advantages of Digital storage oscilloscope.

Q.2 Solve any Eight of the following. **16**

a) What is Need of Programmable instrumentation amplifier?
b) Draw block diagram of AC signal conditioning technique.
c) Give Salient features of Programmable Instrumentation amplifiers
d) Give the features of the data loggers.
e) What is the role of preamplifier in signal conditioning?
f) Draw the block diagram of chopper amplifier.
g) What is need of Data Acquisition System (DAS)?
h) Draw pin configuration of the IC AD620.
i) Draw Block Schematic of digital multimeter.
j) Draw Block diagram of ph meter.

Q.3 A) Attempt any Two of the following. **10**

1) Describe conductivity meter with block diagram.
2) Explain Electromagnetic and Electrostatic shielding.
3) Explain the X-Y recorder with neat labelled diagram.

B) Short note on Magnetic Recorder. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Write a note on 4-20mA current transmission.
2) Explain Digital data recorder.
3) Write a note on Grounding.

B) Explain Function generator. **08**

Q.5 Attempt any Two of the following. **16**

a) Give Salient features, Draw & Explain Block diagram and Pin description of AD594/595.
b) Describe general DAS with block diagram. And explain the multichannel DAS.
c) Explain in detail CRO with neat labelled diagram.

SLR-DA-253

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper - XVI)
Data Communication and Networking - II (19201670)

Day & Date: Thursday, 23-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Multiple choice questions. **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) Physical Layer

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 the above

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 sent 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 travels.

Q.2 Solve any Eight of the following. **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) Attempt any Two of the following. **10**

1) What is an error? Explain the types of errors.
2) Explain Congestion Control in Datagram Subnets.
3) Explain Simplex and Stop and Waitprotocol.

B) Short note on FTP and SMTP. **06**

Q.4 A) Attempt any Two of the following. **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 Attempt any Two of the following. **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?

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
PHYSICS (Paper - XVII)
Electronics (19201622)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks
4) Use of log tables and calculator is allowed.

Q.1 A) Multiple choice questions. **10**

1) The Schmitt trigger circuit is modification of _____ multivibrator.
   a) Universal b) Astable
   c) Bistable d) Monostable

2) An ideal Op. Amp. is supposed to have _____.
   a) infinite input impedance b) Zero output impedance
   c) infinite bandwidth d) all the above

3) Most popular IC used in timing circuit is IC _____.
   a) 555 b) LM317
   c) 741 d) 7400

4) IC 555 uses _____ comparators.
   a) two b) three
   c) four d) five

5) The control element of SCR is _____.
   a) cathode b) anode
   c) anode supply d) gate

6) SCR is a _____ triggered device.
   a) voltage
   b) current
   c) voltage as well as current
   d) resistance

7) Which of the following is fastest switching device?
   a) JFET b) BJT
   c) MOSFET d) Triode

8) LED fabricated from GaAsP emit radiation in the _____ region.
   a) infra -red b) Ultraviolet
   c) visible d) non visible

9) Which power semiconductor device is not having gate?
   a) JFET b) JGBT
   c) TRIAC d) DIAC

10) Which semiconductor device behaves like two SCRs?
   a) MOSFET b) JFET
   c) UJT d) TRIAC

B) Fill in the blank/Definition/One sentence answer/ One word answer/ Give the name/Predict the product etc. **06**

1) Op. Amp. has input currents are 30 nA and 20 nA. Calculate is its input bias current.
2) LED stands for _____.
3) Define the term slew rate.
4) Write SCR turn ON and turn OFF methods.
5) E-MOSFET can be operated in _____ mode.
6) What is the value of CMRR for an ideal Op. Amp.?

Q.2 Solve any eight of the following: **16**

a) Draw the symbol of Nixie tube.
b) What is triac?
c) Define Breakover voltage.
d) Draw the symbol of SCR.
e) Draw the symbol of n channel D - MOSFET.
f) What is PNPN diode?
g) Write any two names of Active and Passive display.
h) An Op. Amp. is used in non-inverting mode with R1 = 1 KΩ, R2 = 14 KΩ. Calculate output voltage for Vi = 150 mV.
i) In IC 555, monostable mode R 2KΩ and $C = 1\ \mu F$. Calculate pulse width.
j) Define Duty cycle.

Q.3 A) Attempt any two of the following: **10**

1) Explain Liquid Crystal Display with its important features.
2) Explain I-V characteristics of SCR.
3) Draw and explain block diagram of Op. Amp.

B) Write a note on Electrophoretic Image Display. **06**

Q.4 A) Attempt any Two of the following: **08**

1) For IC 555 astable multivibrator, if C= 0.01 μF , $R_A = 10$ KΩ , $R_B = 10$ KΩ. Calculate frequency and duty cycle.
2) Explain Diac as lamp dimmer.
3) Explain I-V characteristics of Triac.

B) Draw the symbol of E- MOSFET Explain operation and transfer characteristics of E- MOSFET. **08**

Q.5 Attempt any Two of the following. **16**

a) With neat circuit diagram, explain Op. Amp as inverting amplifier.
b) Draw and explain functional block diagram of IC 555.
c) Explain operation of D-MOSFET.

SLR-DA-255

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
CHEMISTRY (Special Paper - XVI)
Analytical and Industrial Organic Chemistry (19201617)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat diagram and give equations wherever necessary.

Q.1 A) Multiple choice questions. **10**

1) Alkaline hydrolysis of fats/oils is called _____.
   a) esterification b) neutralization
   c) diazotisation d) saponification

2) 1,3-butadiene on treatment with _____ gives Buna-S rubber.
   a) styrene b) acrylonitrile
   c) formaldehyde d) phenol

3) In phase transfer catalyst, the reaction between an organic halide and sodium cyanide is _____ reaction.
   a) SN^1 b) SN^2
   c) SN^i d) elimination

4) _____ is used to separate the soap after saponification.
   a) NaOH b) NaCl
   c) KOH d) NH_4OH

5) Paper chromatography is based on _____.
   a) partition coefficient b) adsorption coefficient
   c) solvent extraction d) none of these

6) _____ act as catalyst for biocatalytic reactions.
   a) Enzymes b) Proteins
   c) Carbohydrates d) Alcohols

7) Cane sugar has the formula _____.
   a) $C_6H_{12}O_6$ b) $C_{12}H_{22}O_{11}$
   c) $C_6H_6O_6$ d) $C_{12}H_{20}O_{10}$

8) In gas chromatography, the _____ is used as a mobile phase.
   a) methanol b) hydrogen
   c) hexane d) water

9) Ketone on reduction with $LiAlH_4$ form _____ alcohol.
   a) primary b) secondary
   c) tertiary d) none of these

10) Diisocyanate and diol on polymerisation give _____.
   a) polyurethane b) Bakelite resin
   c) Buna-N-rubber d) Buna-S-rubber

B) Answer the following questions. **06**

1) _____ detergents are known as invert soaps.
2) Alkene on oxidation using O_SO_4 forms _____.
3) _____ is added during vulcanisation of rubber.
4) Ethyl alcohol having small amount of poisonous substances is called as _____.
5) The monomers for Buna-S rubber are 1,3-butadiene and _____.
6) In paper chromatography, the stationary phase is always _____.

Q.2 Solve any Eight of the following: **16**

a) Give any two principles of green chemistry.
b) Write the reactions involved in saponification.
c) Define
1) Elastomers
2) Thermosettings
d) Name the steps involved in the production of raw sugar.
e) What is rate of flow (Rf value)?
f) What are ampholytic detergents? Give example.
g) What are zeolites? Give their one use.
h) Define homopolymer. How is polyethylene prepared?
i) What is the general principle of chromatography?
j) Write the byproducts of sugar industry.

Q.3 A) Attempt any Two of the following: **10**

1) Give any three synthetic applications of sodium borohydride.
2) Write preparation of Teepol and Deriphat.
3) What is reactivity reversal/umpolung? Explain with suitable examples.

B) Short Note/Solve **06**

Give synthesis and uses of urea-formaldehyde resins and polyurethanes.

Q.4 A) Attempt any Two of the following: **08**

1) Explain hot process for manufacture of soap.
2) Give synthesis and uses of phenol-formaldehyde resins.
3) Draw a neat and labeled schematic diagram of instrument used gas chromatography.

B) Describe/Explain/Solve **08**

Explain types of detergents.

Q.5 Attempt any Two of the following. **16**

a) Give synthesis and uses of Buna-S and Buna-N rubbers.
b) Define phase transfer catalysts with example. Explain their advantages and applications.
c) Explain cationic addition polymerisation and anionic addition polymerisation with suitable.

SLR-DA-257

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XVI)
Nursery, Gardening & Horticulture (19201608)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw necessary diagrams whenever necessary.
4) Use of log table and calculators are allowed.

Q.1 A) Multiple choice questions. **10**

1) Which chemical is used for ripening of fruit?
   a) IBA b) Cytokinin
   c) Gibberellic acid d) Ethylene

2) Germination of seed with in fruit is called as _____.
   a) Ovipary b) Apomixis
   c) Vivipary d) Asepsis

3) The art of making animal shapes in plants is called _____.
   a) Topiary b) Pinching off
   c) Edging d) Hardening

4) Air layering is otherwise called _____.
   a) Stool layering b) Chinese layering
   c) Serpentine layering d) Tip layering

5) Shield budding is done in _____.
   a) Rose b) Grapes
   c) Hibiscus d) Rubber

6) Leading flower producing state in India is _____.
   a) Tamilnadu b) Kerala
   c) Andhra Pradesh d) Karnataka

7) Which among the given city is known as Garden city?
   a) Delhi b) Mumbai
   c) Bengaluru d) Pune

8) Male plants can be converted to female plants by _____.
   a) Inarching b) Top working
   c) Epicotyl grafting d) Wedge grafting

9) The tag colour associated with certified seed _____.
   a) Yellow b) Blue
   c) Purple d) White

10) The seed act come into force in the year _____.
   a) 1958 b) 1946
   c) 1966 d) 1972

B) Fill in the blank **06**

1) _____ flower is referred as 'Glory of East'?
2) Apple of Paradise is _____.
3) Aristocrat of flowers is _____.
4) Yellow revolution is associated with _____.
5) Repair grafting is otherwise known as _____.
6) Brown manuring refers to _____.

Q.2 Solve any eight of the following: **16**

a) Define floriculture.
b) Define olericulture.
c) What is seed dormancy?
d) Define pomology.
e) What is seed testing?
f) Write factors affecting seed viability.
g) Define Plant growth regulators.
h) What are Biofertilizers?
i) What are Biopesticides?
j) What is weed?

Q.3 A) Attempt any Two of the following: **10**

1) Define horticulture and explain the use of CAD in Landscape gardening.
2) Define Nursery and explain the objective and scope of Nursery gardening.
3) Define seed dormancy and explain the methods of breaking seed dormancy.

B) Write short note on the following. **06**

Seed banks and its importance.

Q.4 A) Attempt any Two of the following: **10**

1) Define vegetative propagation and explain in detail Budding.
2) What is floriculture? Explain in detail the importance of cut flowers.
3) What is Bonsai? Explain in detail the procedure of making Bonsai.

B) Write short note on following. **06**

Write in brief fertilizers.

Q.5 Attempt any Two of the following. **16**

a) Define weed. Explain in detail the measures to control the weed.
b) What is flower? Explain the importance of flower shows and exhibitions.
c) What is grafting? Explain in detail types of grafting.

SLR-DA-258

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
BOTANY (Special Paper - XVI)
Biostatistics (19201609)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat, labelled diagrams wherever necessary.
3) Figures to the right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Rewrite the following sentences, choosing the correct alternative: 10

1) Median is denoted by _____ sign.
   a) x- b) Me or Mdn
   c) Mo d) ∑

2) In a throw of coin _____ is the probability of getting head.
   a) 1 b) 2
   c) ½ d) 0

3) In column charts, bars are _____.
   a) Vertical b) Horizontal
   c) False base line d) None of the above

4) Standard deviation was first worked out by _____.
   a) Karl Pearson b) Milton Friedman
   c) Harvey Goldstein d) Herman Hollerith

5) Primary data means _____.
   a) Original Data b) It may be result of survey
   c) It may be result of enquiry d) All of the above

6) A statistical method is treated as a branch of science which deals with _____.
   a) Collection and preservation of data
   b) Analysis
   c) Interpretation of data
   d) All of the above

7) Speed of a vehicle is an example of _____.
   a) Discrete variable b) continuous
   c) nominal d) ordinal

8) A variable taking only particular value is called _____.
   a) Discrete variable b) continuous
   c) nominal d) ordinal

9) Which one of the following is false? Secondary data have sources like _____.
   a) Office records b) Bulletins
   c) Direct interview d) Reports

10) The Chi-square test was worked out by _____.
   a) Karl Pearson b) Milton Friedman
   c) Harvey Goldstein d) Herman Hollerith

B) Attempt the following. **06**

1) Define classification of data
2) What is mean by null hypothesis
3) Give formula to calculate probability.
4) What is mean by central tendency?
5) Define biostatistics.
6) Give formula for Chi-square test.

Q.2 Solve any Eight of the following: **16**

a) Uses of biostatistics.
b) Define secondary data.
c) What is meant by arithmetic mean?
d) Define primary data.
e) What do you mean by alternative hypothesis?
f) State the applications of Chi-square distribution.
g) Write down the conditions for validity of Chi-square test.
h) What are the assumptions of t-test?
i) Define critical region.
j) What do you mean by mode?

Q.3 A) Attempt any Two of the following: **10**

1) Write short note on student t-test.
2) Mention the merits and demerits of primary data collection.
3) Discuss the merits and demerits of range.

B) Short note/Solve the following. **06**

1) Comment on Co-efficient of variations.
2) Discuss the statistical methods of investigations.

Q.4 A) Attempt any Two of the following: **08**

1) Write short note on Chi-square test.
2) Write note on one-dimensional diagrams.
3) Mention any two types of events in probability.

B) Describe/Explain/Solve the following **08**

1) Find out the probability of getting
   i) Head ii) Tail, when single coin is tossed
2) Mention the limitations of biostatistics.

Q.5 Attempt any Two of the following. **16**

a) Mention the functions of biostatistics.
b) Describe the methods of secondary data collection.
c) Calculate S.D. from the given data collected on 10 plants: 55, 58, 60, 62, 68, 65, 66, 72, 75, 69

SLR-DA-259

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ZOOLOGY (Special Paper - XVI)
Applied Zoology (19201630)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams whenever 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 breeding, raising, and harvesting fish, shellfish, and aquatic plants
   a) Sericulture b) Lac culture
   c) Mariculture d) Aquaculture

2) Following _____ are the common fishes selected for pond culture.
   a) Sharks and Rays b) Sardines and Mackerels
   c) Mulletes and Bhetki d) Catla and Rohu

3) The rearing of fish in fresh water and brackish water is called _____.
   a) Inland fishery b) Marine fishery
   c) Crustacean fishery d) Pearl fishery

4) Hook and line are the example of _____.
   a) Fish craft b) Fish gear
   c) Fish by-product d) Fish habitat

5) Honey is _____.
   a) Nectar of a flower
   b) Nectar stored in the honey sac
   c) Nectar mixed with saliva and stored in the honey sac
   d) Nectar and water sucked by honey bee

6) Apis dorsata is used to refer to _____.
   a) Little bee b) Indian bee
   c) European bee d) Rock bee

7) Which of the following silk is mainly produced in Assam _____.
   a) Arundi silk b) Natural silk
   c) Muga silk d) Tassar siik

8) Lac is produced by insect _____.
   a) A.dorsata b) A.mellifera
   c) L.lacca d) B.mori

9) Following _____ is an example of Milch breed.
   a) Sahiwal b) Nageri
   c) Hallikar d) Malvi

10) Poultry birds which are exclusively grown for meat are called _____.
   a) Layers b) Cockerel
   c) Rooster d) Broilers

B) Fill in the blank/Definition/One sentence answer/One word answer/Give the name/Predict the product. **06**

1) Breeding pond
2) What is Monoculture?
3) Fish morphometry
4) Food of Bombyx mori
5) Dairy farming
6) Viral disease of fowl

Q.2 Solve any Eight of the following: **16**

a) Preservation of fish
b) Fish seed
c) Isinglass and Manure
d) Medicinal value of honey
e) Uses of Lac
f) Types of silk
g) Figure of Silkworm larvae
h) Milk products
i) Nutritive value of fowl egg
j) Types of cattle breed

Q.3 A) Attempt any Two of the following: **10**

1) Define fish culture? Explain factors affecting the fish culture.
2) Describe the life cycle of Bombyx mori.
3) Give an account on processing of Lac.

B) Short Note **06**

Give an account on bee products and their uses.

Q.4 A) Attempt any Two of the following: **08**

1) Give an account on common fish diseases.
2) Describe milk and milk products.
3) Describe the natural enemies and their control of silkworm.

B) Describe/Explain/Solve **08**

Describe the culture of fresh water Prawn.

Q.5 Attempt any Two of the following. **16**

a) Define Aquaculture? Describe the culture of Indian major carps.
b) Describe application of biostatics in fisheries.
c) Give an account on common dairy animals and write a brief note on its diseases.

Seat No.	

Set **P**

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - XVI)
Integral Calculus (19201638-A)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Use of calculator is allowed.
3) Figures to the right indicate full marks

Q.1 A) Choose the correct alternative for each of the following. **10**

1) Integral $\int_0^{\pi/2} \frac{\sin x}{x^n}\, dx$ is convergent if _____.

a) $n < 2$ b) $0 < n < 1$
c) $n \geq 1$ d) for any value of n

2) If $f(x)$ is bounded and integrable in $[a, \infty]$ where $a > 0$. Then if there exists a number $\mu \leq 1$, such that $\lim_{n\to\infty} x^{\mu} f(x)$ exists and is non-zero then $\int_0^{\infty} f(x)dx$ is _____.

a) convergent b) divergent
c) oscillatory d) proper

3) The integral $\int_0^1 x^{m-1}(1-x)^{n-1}\, dx$ is convergent when _____.

a) $m > 0$ b) $n > 0$
c) $m > 0, n > 0$ d) $m > 1, n > 1$

4) $\int_0^{2\pi} \tan x\ dx$ is an improper integral of _____.

a) first kind b) second kind
c) third kind d) none of these

5) The value of $\int_0^{\infty} \frac{x^{p-1}}{1+x}\, dx$, where $0 < p < 1$ is _____.

a) $\frac{\pi}{\sin\left(\frac{p\pi}{2}\right)}$ b) $\frac{\pi}{\sin p\pi}$
c) $\frac{\pi}{\cos p\pi}$ d) $\frac{\pi}{\cos\frac{p\pi}{2}}$

6) If $n > 0$, then the Gamma function is defined as:

a) $\int_0^1 e^{-x}x^{n-1}\, dx$ b) $\int_0^1 e^{-nx}x^{n-1}\, dx$
c) $\int_0^{\infty} e^{-x}x^{n+1}\, dx$ d) $\int_0^{\infty} e^{-x}x^{n-1}\, dx$

7) The value of $\int_0^{\infty}[-\log t]^{m-1}\, dt$ is _____

a) $2\lfloor m$ b) $\lfloor m$
c) $\lfloor m+1$ d) $\lfloor m+\frac{1}{2}$

8) For the transformation $x + y = u, y = uv$ the value of $dxdy =$ _____
   a) $du\ dv$ b) $u^2 du\ dv$
   c) $\frac{1}{u} du\ dv$ d) $u\ du\ dv$

9) Value of $\int_0^{\pi/2} \int_0^{a\cos\theta} r \sin\theta\ d\theta\ dr$ is _____.
   a) $\frac{1}{6}\ a^2$ b) $\frac{1}{3}\ a^2$
   c) $\frac{1}{2}\ a^2$ d) $\frac{5}{6}\ a^2$

10) Area laying between the parabola $y = 4x - x^2$ and the line $y = x$ is _____.
   a) $\frac{1}{2}$ b) $\frac{3}{2}$
   c) $\frac{5}{2}$ d) $\frac{9}{2}$

B) Answer in one sentence. **06**

1) Give any one example of improper integral of first kind.
2) For what values of p the improper intergral $\int_a^b \frac{dx}{(x-a)^p}$ converges?
3) Show that $\lceil n = \infty$, if n is zero.
4) Show that $B(x+1, y) = \frac{x}{x+y} B(x, y)$
5) Define multiple integrals.
6) State the formula for volumes of the solids of revolution.

Q.2 Solve any eight of the following: **16**

a) State the comparison test.

b) Examine the convergence of $\int_0^1 \frac{dx}{1-x}$

c) State the Cauchy's Test.

d) Evaluate $\int_1^\infty \frac{dx}{x^{3/2}}$

e) Compute $\lceil -\frac{1}{2}$

f) Show that $B(m, n) = B(n, m)$

g) Evaluate $\int_1^2 \int_0^{3y} y\ dy\ dx$

h) Find $\int_0^\pi \int_0^{a\theta} r^3 d\theta\ dr$

i) Show that $\lceil n = \frac{1}{n} \int_0^\infty e^{-y^{1/n}}\ dy$

j) Evaluate $\int_0^1 \int_0^2 dx\ dy$

Q.3 a) Attempt any Two of the following: **10**

1) Show that $\int_0^{\pi/2} \sin x \log \sin x$ is convergent with value $\log(2/e)$.

2) Prove that $\int_0^{\pi/2} \sin^m \theta \cos^n \theta\ d\theta = \frac{\lceil \frac{m+1}{2} \lceil \frac{n+1}{2}}{2 \lceil \frac{m+n+2}{2}}$

3) Evaluate $\iint_A r^2 \sin\theta\ d\theta\ dr$ over the area of cardioid $r = a(1 + \cos\theta)$ above the initial line.

b) State and prove the Cauchy's test for convergence. **06**

Q.4 A) Attempt any Two of the following: **08**

1) Test the convergence of $\int_0^2 \frac{\log x}{\sqrt{2-x}}\, dx$

2) Evaluate $\int_0^1 \frac{x^{m-1}+x^{n-1}}{(1+x)^{m+n}}\, dx$

3) Evaluate $\int_0^{\pi/2}\int_0^{\pi/2} \sin x \sin^{-1}(\sin x \sin y) dx\, dy$

B) State and prove the duplication formula for Gamma function. **08**

Q.5 Attempt any Two of the following. **16**

a) State and prove the Abel's Test for improper integral.

b) Change the order of integration and hence evaluate $\int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x\, dx\, dy}{\sqrt{x^2+y^2}}$

c) Express $\int_0^1 x^m(1-x^n)^p dx$ in terms of the Beta function, and hence evaluate $\int_0^1 x^5(1-x^3)^{10}\, dx$

SLR-DA-261

Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MATHEMATICS (Special Paper - XVI)
Programming in C (19201638-B)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.

Q.1 A) Select the correct alternative for each of the following. **10**

1) Every C - program must have _____ main function.
   a) any number of b) two
   c) at least one d) exactly one

2) _____ was the first computer language to use a block structure.
   a) ALGOL b) BCPL
   c) B d) FORTRAN

3) The _____ function is used to clear the function.
   a) getch () b) putch ()
   c) clrscr () d) printf ()

4) _____ are only in lower case letters.
   a) Keywords b) Identifiers
   c) Variables d) Constants

5) An operator is a _____ that tells the computer to perform certain mathematical or logical manipulation.
   a) Statement b) Command
   c) Keyword d) Symbol

6) The use of qualifier _____ on integers is optional.
   a) long b) unsinged
   c) signed d) double

7) Bitwise operators may not be applied to _____.
   a) int b) short int
   c) unsigned int d) float or double

8) The field specification for reading character strings is _____
   a) % wsd b) % wc
   c) % ws d) % *f

9) _____ is the built-in multiway decision statement in C.
   a) for b) switch
   c) if d) while

10) The _____ is the exit-controlled loop.
   a) while b) do
   c) do while d) for

B) Fill in the blanks. **06**

1) Elements in an array are accessed _____.
2) The total valid character used in C are _____.
3) If $a = -6$, and $b = 7$, then value of $a/b =$ _____.
4) C evaluates the expression $9 - 12 / (3 + 3) \times (2 - 1)$ as _____.
5) For integer data type _____ format specifier is used.
6) Two dimensional array is also called as _____.

Q.2 Attempt any Eight of the following: **16**

a) What does void main (void) mean?
b) What is mean by C - token's?
c) State the format of simple C programs.
d) State the logical operators with meaning.
e) Define the comma operator?
f) Write any four Mathematical functions (used in C) with meaning.
g) Write the syntax of reading and writing a character.
h) Write the flow chart of simple if control.
i) Define the term counter - controlled loop.
j) Write a C - program to add a given two numbers.

Q.3 A) Attempt any Two of the following: **10**

1) Write a note on relational operators.
2) Explain the else if ladder.
3) Explain in detail one-dimensional arrays.

B) Write a note on basic structure of C - programs. **06**

Q.4 A) Attempt any Two of the following: **08**

1) Write a note of Switch statement.
2) Discuss the Backslash character constants.
3) Explain assignment operators used in C.

B) Discuss in detail the formatted output. **08**

Q.5 Attempt any Two of the following. **16**

a) Write a note on two-dimensional arrays with its initialization.
b) An electric power distribution company charges its domestic consumers as follows:

Consumption units	Rate of charge
0 – 20	Rs. 0.50 per unit
201 – 400	Rs. 100 plus Rs. 0.65 per unit excess of 200
401 – 600	Rs. 230 plus Rs. 0.80 per unit excess of 400
601 and above	Rs. 390 plus Rs. 1.00 per unit excess of 600

Write the C - program to read the customer number and power consumed and print the amount to be paid by the customer.

c) i) Discuss the for statement in detail.
ii) Write a note on return values and their types.

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - XVI)
Quality Management and Reliability (19201650)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figures to the right indicate full marks
4) Use of log table and 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) $\underline{X}$ & S chart d) CUSUM Chart

2) Which of the following is correct for λ in EWMA expression?
   a) $\lambda > 0$ b) $0 < \lambda \leq 1$
   c) $1 < \lambda$ d) $\lambda \geq 1$

3) TQM stands for ____.
   a) Total Qualitative Management
   b) Total Quantity Management
   c) Total Quality Management
   d) None of these

4) DMAIC is often associated with ____.
   a) Six -Sigma b) Kaizen board
   c) Five- Sigma d) Acceptance sampling

5) When we accept the lot in single sampling plan.
   a) $d < c$ b) $d \leq c$
   c) $d > c$ d) None of these

6) Control Chart is a _____.
   a) Process monitoring tool b) Process control tool
   c) Both a and b d) None of these

7) Average Total Inspection for single sampling plan
   a) $n^*P + N^*(1-P)$ b) $n^*P_a + N^*(1-P_a)$
   c) $N^*P + n^*(1-P)$ d) $N^*P_a + n^*(1-P_a)$

8) In double sampling plan, if the numbers of defects is in between the two cut off numbers C1 d C2 then _____.
   a) Accept lot b) Reject lot
   c) Take another sample d) None of these

9) Consumer's risk is probability of _____.
   a) Accepting lot of bad quality
   b) Accepting lot of good quality
   c) Rejecting lot of good quality
   d) Rejecting lot of bad quality

10) Which of the following is not a Dimension of quality?
   a) Performance b) Aesthetics
   c) Check sheet d) Features

B) Fill in the Blanks. **06**

1) PDCA cycle stands for _____.
2) Full form of E in the EWMA chart _____.
3) A set of components whose functioning ensures the functioning of the system is known as _____.
4) Average Sample number for single sampling plan is _____.
5) In acceptance sampling, when there is a finite probability that the lot may be rejected even if quality is actually good is called ____.
6) EWMA charts are better than Shewhart control charts in detecting the _____ shift.

Q.2 Solve any Eight of the following (Two marks each) **16**

a) What is the meaning of quality?
b) What is Six Sigma?
c) What is ASN?
d) Define sample inspection.
e) Define Series System.
f) State magnificent tools of statistical Process Control (SPC).
g) Explain scatter plot or diagram in short.
h) Define LTPD.
i) Define a Structure function of a system of n components.
j) What is ATI?

Q.3 A) Attempt any Two of the following: **10**

1) Write a note on magnificent tool of quality- Pareto diagram.
2) Define OC curve.
3) Show that hazard rate of a series system of components having independent life times is summation of component hazard rates.

B) Write note on DMAIC cycle. **06**

Q.4 A) Attempt any Two of the following: **08**

1) Find the structure function of a Series system of n components.
2) Find the Relationship between Survival function and hazard function.
3) State the control limits of EWMA control chart for monitoring process mean.

B) Write the procedure of Double Sampling Plan. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain Eight dimensions of quality.
b) 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.
c) Explain the Tabular CUSUM for monitoring the process mean.

Seat No.	

Set | P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
STATISTICS (Special Paper - XVI)
Time Series Analysis (19201651)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams whenever necessary.
4) Use of log table and calculator is allowed.

Q.1 A) Choose the correct alternative from the following. **10**

1) Secular trend in time series is of nature _____.
   a) increasing b) decreasing
   c) stagnant d) all the above

2) Moving average remove the cyclical variation if _____.
   a) the period is even
   b) the period is odd
   c) the average is weighted
   d) the period is same as that of cycle

3) Least square method _____.
   a) reduces the calculations
   b) does not give estimate of future
   c) reduces the sum of squares of errors
   d) is subjective

4) In time series analysis the method of moving averages, is used to estimate _____.
   a) seasonal variations b) trend
   c) cyclical variations d) irregular variations

5) In time series analysis the exponential smoothing method helps to _____.
   a) smooth out the fluctuations
   b) remove trend
   c) estimate exponential trend
   d) estimate logarithmic trend

6) In autoregressive model we assume that ____.
   a) the successive values in time series to be dependent
   b) the successive values in time series to be independent
   c) the regression analysis is better than time series analysis
   d) the values in time series are non-normal

7) Prosperity, Recession, Depression and Recovery in a business is an example of _____.
   a) Irregular variations b) Secular trend
   c) Cyclical variations d) Seasonal variations

8) A fire in a factory delaying production for some weeks is _____.
   a) Irregular variations b) Secular trend
   c) Cyclical variations d) Seasonal variations

9) Seasonal variations are _____.
   a) short term variation b) long term variation
   c) sudden variation d) None of the above

10) In moving average method, we cannot find trend values of some _____.
   a) end points b) middle points
   c) starting and end periods d) starting periods

B) Fill in the blanks. **06**

1) In time series values are arranged in _____ order.
2) In time series additive model gives Y = _____.
3) In time series multiplicative model gives Y = _____.
4) Increase sales due to Diwali is due to _____ component time series.
5) Ratio to moving average method is used to estimate ___ component.
6) The link relative is defined as _____.

Q.2 Define the following terms. (Any Eight) **16**

a) Trend
b) Define 'time series' and give illustrations of time series from various fields.
c) Write the difference between seasonal variations and cyclical variations.
d) Write four components of time series.
e) Write note on irregular variations.
f) What do you mean by stationarity?
g) Define autocorrelation function.
h) Explain the term 'season'.
i) Describe the term 'Business cycle'.
j) What are the demerits of least square method?

Q.3 A) Attempt any Two of the following. **10**

1) Describe the moving average method.
2) Discuss the importance and utility of time series analysis in various fields.
3) Describe the procedure of Run test.

B) Describe the procedure of curve fitting least square method. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Describe the procedure of single exponential smoothing.
2) Explain how to fit AR (1) model.
3) Explain progressive average method.

B) Illustrate with examples of the following term. **08**

1) Secular trend
2) Seasonal variations
3) Cyclical variations
4) Irregular variations

Q.5 Attempt any Two of the following. **16**

a) Describe the procedure of 'double exponential smoothing'.

b) Obtain the seasonal indices for the quarters by simple average method assuming that trend is absent.

Year	Quarters No.			
	I	II	III	IV
2017	37	41	33	35
2018	37	39	36	36
2019	40	41	33	31
2020	33	44	40	40

c) Describe the procedure of link relative method.

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
GEOLOGY (Special Paper - XVI)
Geochemistry (19201655)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagrams wherever necessary.
3) Figure to right indicate full marks.
4) Use of log table or calculator is allowed.

Q.1 A) Choose the correct alternative from the option. **10**

1) Two or more substances that have the same or closely similar chemical formulas but different crystal structures are known as:
   a) Isomorphism b) Polymorphism
   c) Pseudomorphism d) None of the above

2) Who introduced the term siderophile, chalcophile, lithophile, and atmophile?
   a) Goldschmidt(1923) b) Clarke(1924)
   c) Ringwood(1975) d) Cameron(1737)

3) Which of the minor element is admitted by potassium minerals?
   a) Strontium b) Barium
   c) Lead d) Rubidium

4) Which of the following is not a suitable pair?
   a) K-Rb b) Al-Ga
   c) Ca-Sr d) Si-Pb

5) The upper crust of the earth mainly consist of _____.
   a) Sandstone b) Shale
   c) Limestone d) Igneous and metamorphic rocks

6) Which one of the following aerolites are?
   a) Iron meteorites b) Iron-stony meteorites
   c) Stony meteorites d) Metallic meteorites

7) Which of the following stable isotopes of hydrogen having atomic number 3:
   a) Protium b) Deuterium
   c) Tritium d) Hydrogen

8) Long -term changes in the geochemical cycle are known as:
   a) Periodic changes b) Permanent changes
   c) Secular changes d) Perennial changes

9) In the periodic table of elements, the elements are arranged in order of:
   a) Decreasing atomic weight
   b) Increasing atomic number
   c) Increasing volume
   d) Decreasing atomic number

10) Which method is used for dating relatively recent geological event?
   a) K - Ar method b) U - Pb method
   c) Carbon -14 methods d) Rb - Sr method)

B) Fill in the blanks: **06**

1) Different element with same neutron number but with different values of atomic weight and protons are known as _____.
2) _____ type of meteorites consists of a silica rich glass resembling obsidian.
3) The metal phase is discontinuous and the silicates are mainly plagioclase feldspar and pyroxene sometimes with accessory olivine is _____.
4) _____ isotopes have proven to be a particular useful tracer to indicate whether magma that formed an igneous rock originated in the crust or the mantle.
5) Elements which readily-form ions with an outermost 8-electron shell are:
6) Which of the following is most abundant rock according to Clarke (1971) average composition of sedimentary rocks?

Q.2 Solve any Eight of the following. **16**

1) Give any two examples of covalent bond.
2) List the kinds of polymorphism.
3) Name any two examples of aerosol.
4) List the four atmophile elements of geochemical classification.
5) Define Half life period.
6) Name any four stable isotopes of oxygen.
7) List the four most abundant elements in average composition of igneous rocks.
8) Define Camouflaged.
9) Name the two types of siderolites.
10) Give the examples of hydrophilic sol.

Q.3 A) Attempt any two of the following: **10**

1) Explain in brief geochemical cycle with suitable diagram.
2) Discuss in detail the geological applications of Isotopes
3) Write short notes on Chondrites.

B) Discuss in short Ur-Th-Pb method of dating the geologic event. **06**

Q.4 A) Attempt any Two of the following: **08**

1) Describe in brief the trace elements in Magmatic crystallization.
2) Write note on geochronology.
3) Discuss in short the different types of solid solution substitution with diagram.

B) Explain in brief cosmic abundance of elements with suitable diagram. **08**

Q.5 Attempt any Two of the following: **16**

a) Describe in detail the Goldsmith's classification of geochemical elements.
b) Discuss in brief the different types of radioactivity. Add note on radioactive decay.
c) Define Colloids. Explain geological evidence for earlier colloids.

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
MICROBIOLOGY (Special Paper - XVI)
Environmental Microbiology (19201663)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams whenever necessary.

Q.1 A) Choose the correct alternative from the option. **10**

1) The ozone is present in _____ layer of atmosphere.
   a) Exosphere b) Troposphere
   c) Stratosphere d) Mesosphere

2) A lake with low primary productivity, as a result of Tow nutrient content is known as _____.
   a) Eutrophic lake b) Mesotrophic lake
   c) Hypereutrophic lake d) Oligotrophic lake

3) Bacteria that grow in mine drainage at pH 1-2 is called as _____.
   a) Alkalophiles b) acidophiles
   c) neutrophiles d) obligate anaerobes

4) Fine organic or inorganic particles suspended in air is called as _____.
   a) Particulate pollutant b) Gaseous pollutant
   c) Aerosol d) Smog

5) Dyes are common in the waste generated from _____ industry.
   a) Textile b) Dairy
   c) Distillery d) Sugar

6) _____ Microorganism plays an important role in leaching of uranium.
   a) *Escherichia coli* b) *Thiobacillus ferroxidans*
   c) *Bacillus Polymyxa* d) *Strepto verticillium* spp.

7) _____ are the commercial methods of bioleaching.
   a) Slope leaching b) Heap leaching
   c) In situ leaching d) All of the above

8) _____ Bacterium is called as the superbug that could clean up oil spills.
   a) *Bacillus subtilis* b) *Pseudomonas putida*
   c) *Pseudomonas denitrificans* d) *Bacillus denitrificans*

9) If COD of a water body is high, it means that the water body is ____.
   a) Highly polluted b) Potable
   c) Least polluted d) Not polluted

10) Oil is extracted by _____ process.
   a) Lemon Sampler
   b) Andersons air sampler
   c) Capillary impinge
   d) Mechanical Extraction & Pre- Press Solvent Extraction

B) Answer the following. **06**

1) Define carbon credit.
2) What is MEOR?
3) Define activated sludge
4) What is algal bloom?
5) Define BOD.
6) Define extremophiles.

Q.2 Write any eight of the following. **16**

a) What is RDAC?
b) What is ecosystem?
c) What is carbon sequestration?
d) What is impingement?
e) What are the significance of microorganisms in the air?
f) Enlist the germ free animals.
g) What is psychrophiles? Enlist two examples.
h) Define fresh water bodies with examples.
i) What is COD?
j) Enlist types of wastes.

Q.3 A) Attempt any two of the following. **10**

1) Explain in brief methods used to study aquatic microorganisms.
2) What is Bioremediation? Discuss in brief various methods of bioremediation of metals.
3) Explain in detail sources and mechanism of ozone layer depletion.

B) Explain in detail on physiochemical and biological consequences of eutrophication. **06**

Q.4 A) Attempt any two of the following. **08**

1) Give a brief account on characteristics of marine bacteria.
2) Explain in detail Characteristics and treatment of sugar and distillery industry waste.
3) Discuss in brief general characteristics of Acidophiles and Alkalophiles.

B) What is Bioleaching? Describe in detail commercial bioleaching process for iron and copper. **08**

Q.5 Attempt any two of the following. **16**

a) Discuss in detail primary and secondary methods of oil recovery.
b) Explain in detail Characteristics and treatment of paper and pulp industry waste.
c) Give a detailed account on Biosafety in microbiology laboratory? Add a note on NIH guidelines.

SLR-DA-267

Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
ELECTRONICS (Special Paper - XVI)
Modern Communication Systems (19201684)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Draw neat labelled diagram wherever necessary.
3) Figures to right indicate full marks.
4) Use of log table and calculators is allowed.

Q.1 A) Select the correct alternative for the following. **10**

1) Cellular telephone use _____ type of operation.
   a) Simplex b) Half duplex
   c) Full duplex d) Triplex

2) A circular orbit around the equator with 24 hours period is called ____.
   a) Elliptical orbit b) Geostationary orbit
   c) Polar orbit d) Transfer orbit

3) _____ is used as a detector in OFC.
   a) LED b) Laser diode
   c) Avalanche Photodiode d) Tunnel diode

4) The operation of a fiber optic cable is based on the principle of _____.
   a) refraction b) total internal reflection
   c) dispersion d) absorption

5) Photodiode operates with _____.
   a) Forward bias b) Reverse bias
   c) Neither (a) nor (b) d) Either (a) or (b)

6) Earth station is used _____.
   a) To control satellite position in geostationary
   b) To control T.V. satellite signal
   c) To transmit the T.V. signals
   d) To receive the T.V. signals

7) Fiber optic cables are made of _____ or _____.
   a) glass, plastic b) glass, paper
   c) paper, plastic d) none of these

8) The master control center for a cellular telephone system is the _____.
   a) Cell site b) Mobile - telephone switching office
   c) Central office d) Branch office

9) The most common radar display is the _____.
   a) A Scan b) Colour CRT
   c) LCD d) Plan Position Indicator

10) A satellite that revolves in same direction, as earth rotates is said to be in a _____.
   a) Posigrade orbit b) Retrograde orbit
   c) Elliptical orbit d) inclined orbit

B) Fill in the blanks. **06**

1) The condition for total internal reflection in optical fiber is, angle of incidence is _____ critical angle.
2) The three main types of LAN topologies are _____.
3) The most popular satellite frequency range is 4 to 6 GHz and is called the _____ band.
4) The most widely used antenna for microwaves is _____ antenna.
5) Modem converts _____, signal into _____ signal and vice versa.
6) Typical downlink frequency of satellite is _____.

Q.2 Solve any Eight of the following. **16**

a) What are the blocks used in cell phone?
b) What is Wi-Fi?
c) Enlist the applications of microwaves.
d) Enlist any four applications of internet.
e) What is transmission line?
f) Define bit rate and baud rate.
g) Give the advantages of optical communication.
h) Give the applications of radar.
i) What is protocol? Give the protocol used in asynchronous data communication.
j) What is velocity modulation?

Q.3 A) Attempt any Two of the following. **10**

1) Write a note on cavity resonator used in microwave communication.
2) Explain in brief Gunn diode.
3) Discuss the applications of satellite communication.

B) Write a short note on Klystron Microwave tube. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain optical fiber communication with necessary block diagram.
2) Give the operational procedure of mobile communication.
3) Draw the block diagram of earth station and explain it.

B) Explain satellite transponder. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain with diagram the working of pulsed radar.
b) What is LAN, MAN and WAN? Explain in brief.
c) What are different network topologies? Explain BUS topology.

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Seat No.		Set	P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
COMPUTER SCIENCE (Paper - XVII)
Advanced Python (19201671)

Day & Date: Friday, 24-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labeled diagrams wherever necessary.
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives. **10**

1) Config() in python Tkinter are used for _____.
   a) Place the widget b) Destroy the widget
   c) Configure the widget d) Change the property of the widget

2) Correct wav to draw a line in canvas tkinter is _____.
   a) line() b) canvas.create_line()
   c) create_line (canvas) d) line(canvas)

3) The pack() function works on tkinter widget according to the _____.
   a) x,y coordinate
   b) row and column vise
   c) left,right,up,down direction
   d) size

4) How we import Tkinter in the python program?
   a) import Tkinter b) import Tkinter as t
   c) from Tkinter import * d) All of these

5) The _____ widget is used to get the data from the user.
   a) Entry b) Text
   c) Label d) Button

6) The Django supports the _____ design pattern.
   a) MVI b) MVP
   c) MVC d) MVVM

7) The _____ method receives UDP message.
   a) recvfrom() b) recv()
   c) listen() d) msgUDP()

8) Django is a _____.
   a) Tool b) Software
   c) Web framework d) Programming language

9) _____ methods is/ are used to put the widget on the screen.
   a) grid() b) pack()
   c) place() d) All of these

10) The response of view can be _____.
   a) HTML contents b) XML document
   c) 404 error d) All of these

B) Fill in the blanks. **06**

1) Render function in Django takes _____ parameters.
2) The _____ function return the root of XML tree as an Element object.
3) To create a project in Django, _____ command is used.
4) The _____ method is used to keeps the root window visible in tkinter application.
5) By using _____ method we are assign function to push button.
6) SAX stands for _____.

Q.2 Solve any eight of the following. **16**

a) What is use of checkbutton and radiobutton widget? Give example.
b) What is difference between canvas and frame?
c) What is use of spinebox? Give example.
d) What is tag handling in text widget? Give example.
e) Which module is used for XML? Give sample XML file.
f) What are steps to use stored procedure? Give example.
g) How to read data from entry widget? Give example.
h) What are differences between app and project in django?
i) How to read IP address and Host name? Give example.
j) What is DOM in XML?

Q.3 A) Attempt any Two of the following. **10**

1) What is XML parser? Explain in detail.
2) Explain Listbox widget with example.
3) What is layout manager? Explain layout manager in detail with example.

B) What is event pattern? Explain any 5 event patterns with example. **06**

Q.4 A) Attempt any Two of the following. **08**

1) Explain scrollbar widget with example.
2) Write python script to insert, and update record.
3) What is migration? Explain with example.

B) Explain Django architecture in detail. **08**

Q.5 Attempt any Two of the following. **16**

a) Write python script to display dept info in tabular form.
b) Explain different Server Socket Methods and Client Socket Methods with example.
c) What are different containers used in python? Explain each with example.

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Seat No.	

Set P

B.Sc. (Semester - VI) (New) (CBCS) Examination: Oct/Nov-2023
Software Testing (19201671-01)

Day & Date: Saturday, 25-11-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

Instructions: 1) All questions are compulsory.
2) Figures to the right indicate full marks.
3) Draw neat labelled diagrams wherever necessary.
4) Use of log table and calculators is allowed.

Q.1 A) Choose the correct alternatives. **10**

1) Which is not a valid phase of SDLC?
   a) Testing Phase b) Requirement Phase
   c) Deployment phase d) Testing closure

2) "V" model is?
   a) Test type
   b) Test Level
   c) Test design technique
   d) Software development testing (SDLC) model

3) Which of the following is not part of the Test document?
   a) Test Case
   b) Requirements Traceability Matrix
   c) Test strategy
   d) Project Initiation Note

4) Which of the following testing method is used to check the code?
   a) Grey box testing b) Black box testing
   c) White-box testing d) Red box testing

5) What are the different levels of Testing?
   a) Integration testing b) Unit Testing
   c) System testing d) All of the above

6) Which of the following is White box testing techniques?
   a) Statement coverage testing
   b) Decision coverage testing
   c) Data flow testing
   d) All of the above

7) What is the key objective of Integration testing?
   a) Design Errors b) Interface Errors
   c) Procedure Errors d) None of the mentioned

8) What is the best time to perform Regression testing?
   a) After the software has been modified
   b) As frequently as possible
   c) When the environment has been modified
   d) Both option a & c

9) Which Test Document is used to define the Exit Criteria of Testing?
   a) Defect Report b) Test Summary Report
   c) Test Case d) Test Plan

10) Which of the testing technique is used for usability testing?
a) White-box testing b) Grey box testing
c) Black Box testing d) Combination of all

B) Fill in the blank. **06**

1) Alpha testing is performed at _____?
2) Functional testing is a _____?
3) _____ is known as a variance from software product specifications.
4) _____ is also known as white-box testing?
5) "Requirement specification, design, coding, testing, installation and maintenance is the various phases of _____.
6) In _____ models we needs to start testing activities along with development activities?

Q.2 Answer any Eight of the following. **16**

a) What is Software testing?
b) What is white box testing?
c) Explain test case template.
d) What is acceptance testing?
e) Describe spiral-model.
f) What is need of software testing?
g) What are test execution reports?
h) Explain summary report.
i) What is load testing?
j) What is review process?

Q.3 A) Attempt any Two of the following. **10**

1) What is Traceability matrix? Give the example of traceability matrix.
2) Explain regression testing? Explain any two types of regression testing.
3) What is defect lifecycle?

B) Explain Prototype model. **06**

Q.4 A) Answer any Two of the following. **08**

1) What is test case? Give the example on writing test case.
2) Give the difference between bug, defect and failure.
3) Describe review report with example.

B) Describe performance testing with their types. **08**

Q.5 Attempt any Two of the following. **16**

a) Explain integration testing with their types.
b) What is black box testing? Give the advantages and disadvantages of black box testing.
c) Explain test case design techniques.

SLR-DA-270

Seat No.	

Set P

B.Sc. (Semester-V) (New) (CBCS) Examination : Oct/Nov-2023
PHYSICS (Special Paper – XI)
Classical Mechanics (19201513)

Day & Date: Tuesday, 05-12-2023 Max. Marks: 80
Time: 03:00 PM To 06:00 PM

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) A rocket works on the principle of conservation of _____.
   a) mass b) angular momentum
   c) linear momentum d) energy

2) A rigid body moving freely in space has _____degrees of freedom.
   a) 3 b) 9
   c) 4 d) 6

3) The Lagrangian function 'L' is expressed as L= _____.
   a) T-V b) T+V
   c) TV d) T/V

4) The number of degrees of freedom for a simple pendulum are _____.
   a) two b) one
   c) zero d) six

5) The constraints on a bead of a uniformly rotating wire in a force-free space is _____.
   a) scleronomous b) holonomic
   c) rheonomous d) both b and c

6) Angular _____ of a particle is the same in fixed & rotating systems.
   a) velocity b) momentum
   c) acceleration d) displacement

7) The brachistochrone problem shows that the transit time of a particle from a higher to a lower point under the influence of gravity is _____.
   a) infinite b) minimum
   c) maximum d) moderate

8) If the amplitude of oscillations remains the same the motion is called _____.
   a) damped b) undamped
   c) critically damped d) over damped

9) For a rigid body, the distance between any two of its constituent particles is _____.
   a) Zero b) Constant
   c) Infinite d) Unity

10) In the rotational motion of a rigid body, the directions of the angular momentum vector and the angular velocity vector are _____.
a) different b) at a right angle to each other
c) the same d) antiparallel to each other

B) Answer the following questions. **06**

1) If the constraints are independent of time, then they are called _____ constraints.
2) In the case of the projectile, in the absence of air resistance, the nature of the trajectory is _____.
3) The centrifugal acceleration has the maximum value at the _____.
4) The transit time of a particle from a higher Point to a lower of gravity under the influence of gravity is minimum along a _____ passing through the two points.
5) In a rigid body, the directions of angular velocity & angular momentum are in general _____.
6) In the antisymmetric mode of Oscillation, the particles are oscillating always _____.

Q.2 Solve any Eight of the following. **16**

1) State conservation theorem of linear momentum of a particles.
2) What is Pseudo force?
3) What is a rigid body?
4) Mention the effects of Coriolis force on nature.
5) What is inertial & non-inertial frame of references?
6) What are degrees of freedom?
7) What are coupled systems?
8) Define the normal mode of Oscillation.
9) Define the range of particle.
10) State Hamilton's Principle.

Q.3 A) Attempt any two of the following. **10**

1) Derive an expression for the total energy of a system of two coupled pendulums.
2) Derive Euler's equations of motion of a rigid body.
3) Show that the shortest distance between any two points in a plane is along a straight line passing through them.

B) Write a short note on the following. **06**

Effect of Coriolis force on a body falling freely under the action of gravity.

Q.4 A) Attempt any two of the following. **08**

1) State & prove the conservation theorem for the energy of a Particle.
2) Explain why the earth is flattened at the poles.
3) What are constraints? Explain different types of constraints.

B) Derive an expression for two angular frequencies involved in coupled oscillations of two Simple Pendulums. **08**

Q.5 Attempt any two of the following. **16**

a) Derive an expression for the range of time of flight of a projectile moving in a resistive medium.
b) State D'Alembert's principle. Obtain Langrange's equation form D'Alembert's principle.
c) Use Hamilton's principle to derive the general Eulers-Lagrangian equations. How did they lead to Lagrange's equations?