

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023
Mathematics Theory - I

Duration: 2 Hours

Max Marks: 60

PART - A

1. Answer any 6 questions. Each question carries 2 marks: (2×6= 12 Marks)

- a. Prove that the square of an integer leaves the remainder 0 and 1 upon division by 4 .
- b. Let a and b be integers ,not both zero , then prove that a and b are relatively prime if and only if there exist integers x and y such that $1 = ax + by$.
- c. Define diagonal and scalar matrix of order n .
- d. Find the rank of the matrix $A = \begin{bmatrix} 1 & 7 & 1 \\ 2 & 3 & 4 \\ 4 & 5 & 7 \end{bmatrix}$ by direct method .
- e. Find the cartesian co-ordinates of the point whose polar co-ordinates are $(-1, \frac{\pi}{4})$.
- f. Define the centre of curvature at any point of a curve and write the formula for the co-ordinates of the centre of curvature .
- g. Find 'c' of Rolle's theorem for $f(x) = x^2$ in $[-2, 2]$.
- h. Find 'c' of Lagrange's mean value theorem for $f(x) = \log x$ in $[1, e]$.

PART - B

2. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

- a. Use the Euclidean Algorithm to obtain integers x and y satisfying $\gcd(24, 138) = 24x + 138y$.
- b. A customer bought a dozen pieces of fruit , apples and oranges for \$1.32 . If an apple costs 3 cents more than an orange and more apples than oranges were purchased , how many peices of each kind were bought ?
- c. Solve the linear congruence $36x \equiv 8 \pmod{102}$.
- d. Solve the system of congruences $x \equiv 5 \pmod{11}$, $x \equiv 14 \pmod{24}$, $x \equiv 15 \pmod{31}$ using Chinese remainder theorem .

PART - C

3. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Find the rank of the matrix $A = \begin{bmatrix} 4 & 3 & 0 & -2 \\ 3 & 4 & -1 & -3 \\ -7 & -7 & 1 & 5 \end{bmatrix}$ using elementary transformations .

b. By using elementary row operations ,find solution or solutions, if they exist , for the system of equations : $-4x_1 + 3x_2 + 2x_3 = -2, 5x_1 - 4x_2 + x_3 = 3$.

c. By using elementary row operations , find solution or solutions if they exist , for the system : $x_1 + x_2 + x_3 = 0, 2x_1 + 4x_2 + 3x_3 = 0, 4x_2 + 4x_3 = 0$.

d. Using the characteristic equation, $1 - x^3 - 3x^2 = 0$ of $B = \begin{bmatrix} 1 & 0 & 1 \\ 0 & 1 & 0 \\ 0 & 0 & 1 \end{bmatrix}$ find B^{-1} .

PART - D

4. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Find the radius of curvature at any point on the curve $y = c \cos h \frac{x}{c}$.

b. (i) Find $\frac{ds}{dt}$ for the curve $x = a \sec t, y = b \tan t$.
(ii) Find $\frac{ds}{d\theta}$ for the curve $r = a(1 + \cos \theta)$.

c. Find the angle of intersection of the cardiodes $r = a(1 + \cos \theta), r = b(1 - \cos \theta)$.

d. Trace the curve $r = a(1 - \cos \theta)$.

PART - E

5. Answer any 2 questions. Each question carries 6 marks: (6×2= 12 Marks)

a. Prove that if a function f is continuous in $[a, b]$, derivable in (a, b) and $f(a) = f(b)$, then there exists at least one value of c in (a, b) such that $f'(c) = 0$.

b. Determine the limit of the following : $\frac{e^x - e^{-x} - 2 \log(1+x)}{x \sin x}, x \rightarrow 0$.

c. Determine the limit of the following : $(\cos x)^{\frac{1}{x^2}}, x \rightarrow 0$.

d. Show that $\forall x \in R, \sin x = x - \frac{x^3}{3!} + \frac{x^5}{5!} + \dots + (-1)^{n-1} \frac{x^{2n-1}}{(2n-1)!} + \dots$

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023

PHYSICS

Mechanics and Properties of Matter

Duration: 2 Hours

Max Marks: 60

PART - A

Answer any five questions, selecting minimum of one question from every unit: 5×9=45

UNIT I

- 1 a) Show that velocity is not an invariant to Galilean transformation.
 b) What is the meaning of mass-energy equivalence? Establish mathematically Einstein mass-energy relationship. (2+7)
- 2 a) Is kinetic energy a conservative force? Explain.
 b) Define Planar vector. If \vec{A} is a planar rotating vector of constant magnitude and $\vec{A} \perp$ is a vector of same magnitude in a perpendicular direction in the same plane, show that $\frac{d\vec{A}}{dt} = A\vec{A} \perp$ and $\frac{d\vec{A} \perp}{dt} = -\dot{\lambda}\vec{A}$ (2+7)

UNIT II

- 3 a) What is a geosynchronous satellite and how is it different from a geostationary satellite?
 b) Derive the formula for Moment of inertia used in the experiment without neglecting the friction at bearings of the flywheel. (2+7)
- 4 a) Show that motion of a particle with uniform velocity in a circle constitutes central motion.
 b) Derive an expression for the moment of inertia of a rectangular lamina about an axis at one of its sides and about an axis passing through its centre and perpendicular to its plane. (2+7)

UNIT III

- 5 a) Give the advantage of I-section girders?
 b) Derive an expression for torsional couple per unit twist. (2+7)
- 6 a) What is the beam? Define the neutral layer of a beam.
 b) Derive the relation between the three elastic moduli in the case of an isotropic solid. (2+7)

UNIT IV

- 7 a) How does viscosity vary with temperature and pressure?
b) Derive Stoke's formula for viscous force acting on a body falling through a viscous medium. (2+7)
- 8 a) Arrive at an expression for the work done during the expansion of a liquid film.
b) Give the theory and derive the expression for finding surface tension of a liquid by drop weight method. (2+7)

PART - B

Answer any three questions

3×5= 15

- 9 A rod of length 1m is moving with a velocity of $0.6c$. Calculate the percentage contraction in length. At what velocity the relativistic velocity of the moving rod is 25%?
- 10 What is the period of a compound pendulum formed by pivoting a meter scale through 90 cm mark so that it is free to oscillate about a horizontal axis? Also calculate the position of four collinear points at which the periods are the same.
- 11 A wire 4 m long and 0.3 mm in diameter is stretched by 1.5 mm by a force of 0.8 kgwt. Calculate the potential energy stored in the wire.
- 12 Calculate the excess pressure inside a soap bubble of radius 3×10^{-3} m. surface tension of soap solution is 20×10^{-3} N/m.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023

BOTANY

Botany Theory - I : Microbial Diversity and Technology

Duration:2 Hours

Max Marks:60

I. Answer any Five of the following :

(5×2= 10 Marks)

1. Who proposed the five kingdom classification? Mention the kingdoms.
2. What is dark field microscope?
3. What is packed cell volume?
4. Define Phototrophs and Chemotrophs.
5. Draw a neat labelled diagram of SARS-COV-2.
6. Draw a diagram of structural organization of virioids.
7. Write the causative organism and any two symptom of Black rust of Wheat.
8. What are foliose lichen? Give an example.

II. Answer any FOUR of the following :

(4×5= 20 Marks)

9. Write the difference between basic and neutral stain.
10. Write a note on Tyndallisation
11. Define (i) Vaccination (ii) Immunisation (iii) First generation vaccine (iv) Taxoid (v) Vaccine
12. Explain binary fission in bacteria.
13. Write a note on photosynthetic bacteria.
14. Write the characteristic features of Kingdom Monera.
15. Define i) Indicator media ii) Transport media
16. Explain any two diseases caused by Prions.

III. Answer any THREE of the following :

(3×10= 30 Marks)

17. Explain the thallus organisation in (i) Rhizopus (ii) Penicillium
18. Write the contributions of (i) Robert Koch (ii) Sergius Winogradsky (iii) M.W. Beijerinck
19. Explain in detail the microbial cultures based on media, media pouring and inoculation.
20. Explain parasexuality in Fungi.

21CHEC101

Reg No :

**CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023**

CHEMISTRY

Analytical and Organic Chemistry I

Duration: 2 Hours

Max Marks: 60

PART - A

I. Answer any Six from the following:

(2×6= 12 Marks)

1. Define sampling.
2. Define absolute error and relative error.
3. Give the properties of a washing solution in gravimetric analysis
4. Give any two indicators used for a strong acid- strong base titration.
5. Give reason: Benzoic acid is a stronger acid than acetic acid.
6. Explain with suitable example substitution reaction.
7. Explain hydration reaction of alkenes with suitable example.
8. Explain epoxidation reaction of alkenes with suitable example.

PART - B

II. Answer any SIX of the following choosing at least one question from each unit:

(6×8= 48 Marks)

UNIT I

9. a. Calculate correlation coefficient for the following data:

Conc of Potassium ions (x1)	2	4	6	8	10
Intensity (y1)	15	30	45	60	70

b. What are the safety measures to be followed in Chemical laboratory? (4 + 4)

10 a. What is meant by technique? How are analytical techniques classified?

b. For titrating 10 ml of a solution with the help of a micro burette, the volume of titrant used are 9.98, 9.99, 9.99, 9.95, 10.00 and 10.02. Find out the range, standard deviation, and variance. (4+4)

UNIT II

11. a. What do you understand by acid-base and complexometric titrations?
b. 10g of NaCl is dissolved in 1000g of water. If the density of the resulting solution is 0.997g/ml. Calculate molarity, normality, mole fraction of the solute. Assume the volume of solution is equal to that of solvent. (4+4)
12. a. Explain the procedure for determination of alkalinity of water.
b. Explain the action of the theory of acid-base indicator. (4+4)

UNIT III

13. a. Explain the mechanism of free radical addition of HBr to propene.
b. Explain with suitable example (i) Wurtz reaction (ii) Wurtz Fittig reaction. (4+4)
14. a. Explain the mechanism of addition of bromine to 1,3 butadiene.
b. Write a short note on aromaticity. (4+4)

UNIT IV

15. a. How is chlorobenzene converted to aminobenzene? Give the mechanism of this reaction.
b. Explain the stability of carbocations. (5+3)
16. a. Why methyl group in toluene is o- and p- directing towards electrophilic substitution?
b. Explain the mechanism of halogenation of alkane. (4+4)

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023

MICROBIOLOGY
Microbiology Theory - I

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) Write a note on the phases in the history of Microbiology.

OR

- 2) Write a short note on resolution power and magnification of a microscope.

UNIT 2

- 3) Write a short note on filtration.

OR

- 4) Explain the principle of Gram staining.

UNIT 3

- 5) Write a brief note on transformation.

OR

- 6) Write a brief note on cell wall of Archaea.

UNIT 4

- 7) Write a short note on nucleus.

OR

- 8) Comment on the membrane proteins in a eukaryotic cell.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Describe the scope of Microbiology.

OR

10) Describe the contributions of Indian scientists to the field of Microbiology.

UNIT 2

11) Explain the use of chemicals as disinfectants.

OR

12) Explain the principle and steps of cryopreservation. Add a note on its advantages.

UNIT 3

13) Give a detailed account on inclusion granules.

OR

14) Explain the structure of flagella and add a note on its arrangement.

UNIT 4

15) Give a detailed account on Peroxisomes and Lysosomes in eukaryotes.

OR

16) Explain sexual reproduction in Protozoa.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023
COMPUTER ANIMATION
Fundamentals of Arts and Animation

Duration:2 Hours

Max Marks:60

PART A

Answer any FIVE questions:

(5×2= 10)

- 1) What is a curved line?
- 2) What is shallow copy in animation?
- 3) Define direct light.
- 4) What is conceptual unity?
- 5) How arts help in animation?
- 6) What is used in collage animation?

PART B

Answer any FIVE questions :

(5×6= 30)

- 7) Explain implied time, actual time and time in art.
- 8) Explain anticipated motion.
- 9) Write a note on contrast, isolation and placement technique to bring contrast.
- 10) How do we obtain tertiary colors?
- 11) Write a note on silent era.
- 12) List the animation technique to reduce the budget.

PART C

Answer any TWO questions :

(2×10= 20)

- 13) Write a note on points and lines.
- 14) How to create balance in art? Explain.
- 15) Write a note on stop motion animation, motion capture, 2D animation, 3D animation, clay animation.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023
COMPUTER SCIENCE
Computer Science Theory - I

Duration:2 Hours

Max Marks:60

PART A

Answer any FIVE questions:

(5×2= 10)

- 1) Define a) Algorithm b) Flowchart
- 2) Write any four relational operators in C.
- 3) What is a two dimensional array? Write its syntax.
- 4) What is call by value?
- 5) What are C tokens? Give an example.
- 6) Give an example to initialize structure object.

PART B

Answer any FIVE questions :

(5×6= 30)

- 7) Explain system software with any two examples.
- 8) What are constants? Explain any two types.
- 9) Explain any three string functions in C. Give an example for each.
- 10) What is an union? What is the advantage of union?
11. Explain a) Documentation section b) Link section c) Definition section
12. Explain else-if ladder with syntax and example.

PART C

Answer any TWO questions :

(2×10= 20)

13. Convert the following numbers to decimal: a)(1011110)₂ b)(237)₈ c)(2CD)₁₆
d)(1010)₈
14. a) Explain any two datatypes in C with examples.
b) What is a variable? With an example, explain how to declare and initialize a variable.
15. Explain with syntax and example a) goto b) continue

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023
STATISTICS
Statistics Theory - I

Duration:2 Hours

Max Marks:60

Answer any THREE of the following : (3×2= 06)

1. Distinguish between inclusive and exclusive class intervals.
2. Distinguish between SRSWR and SRSWOR.
3. List all the measures of central tendency.
4. Distinguish between correlation and regression.
5. Define mathematical Expectation.

Answer any FOUR of the following in not more than a page each : (4×6= 24)

6. Describe the construction of histogram.
7. Show that standard deviation depends on the scale but not on the origin.
8. Find the AM of the series $a, a+d, a+2d, \dots, a+nd$.
9. In case of bivariate data, how do you fit an equation of a straight line?
10. Derive an expression for Spearman's rank correlation coefficient when there are no ties.
11. Show that for fixed B with $P(B) > 0$, $P(A/B)$ satisfies all the three axioms of probability.

Answer any THREE of the following in not more than two page each : (3×10= 30)

12. Express r^{th} central moments in terms of raw moments.
13. If X and Y are the two independent variables having 0 means and variances 1. Find the correlation between $(X+2Y)$ and $(X+Y)$.
14. In a bivariate distribution of the variables X and Y, derive the regression equation of Y on X.
15. State and prove the multiplication theorem of probability for any two events. What will happen if the events are independent?
16. a) Show that conditional probability satisfies the axioms of probability. (5)
b) State and prove Baye's theorem of inverse probability. (5)

21ZOOC101

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. FIRST SEMESTER DEGREE EXAMINATION JANUARY 2023

ZOOLOGY
Zoology Theory - I

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) Comment on the Respiratory enzyme complexes of ETS.

OR

- 2) Draw a neat labelled diagram of the plasma membrane.

UNIT 2

- 3) Write a brief note on the functions of nucleolus.

OR

- 4) What are cell junctions? Write its significance.

UNIT 3

- 5) Explain Environmental sex determination with an example.

OR

- 6) What is a Monohybrid cross? Explain with *Pisum sativum* as an example.

UNIT 4

- 7) What is Trypanosomiasis? Add a note on the causative organism and the vectors transmitting the infection.

OR

- 8) Explain the life cycle of *Giardia lamblia* with a neat labelled diagram.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Describe in detail the various components of the endomembrane system with a neat labelled diagram.

OR

10) Describe the structure and functions of intermediate filaments using a neat labelled diagram.

UNIT 2

11) Give an account of cell division by Mitosis.

OR

12) Give a detailed account of different types of RNA.

UNIT 3

13) Explain cytoplasmic inheritance with suitable example.

OR

14) Define Complementary genes. Explain with an example.

UNIT 4

15) Describe the various forms of numerical aberrations occurring in chromosomes.

OR

16) Explain color blindness inheritance in humans.
