

21STAC201

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
STATISTICS

Probability and distributions - I

Duration: 2 Hours

Max Marks: 60

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

1. Define Poisson distribution and write its p.m.f.
2. Derive the MGF of Uniform distribution with parameters (a, b).
3. Show that total number of class frequencies of all orders for n attributes is 3^n .
4. Define class frequencies.
5. Write the commands for find the following: (i) N (ii) n

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

6. Obtain the mean and variance of Hypergeometric distribution.
7. Obtain the Moment Generating Function of Negative Binomial distribution and hence find mean and variance.
8. Define Beta distribution of the second kind. Find its mean and variance.
9. Derive the mode of Normal distribution.
10. Obtain an expression for $r_{12,3}$.
11. Write a programme to obtain r_{12} from the following data:

X1	12	18	22	26
x2	15	23	29	33

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

12. Find the mode of Binomial distribution.

13. Define Exponential distribution with parameter θ and obtain the first four central moments of this distribution and comment on the kurtosis.
14. Define Gamma distribution with parameter n and obtain the first four central moments of this distribution and comment on the skewness and kurtosis.
15. If $X_1=Y_1+Y_2$, $X_2=Y_2+Y_3$ and $X_3=Y_1+Y_3$ where Y_1, Y_2 and Y_3 have zero mean, having variance=1 and they are uncorrelated variables, then find $R_{2,31}$.
16. Derive the regression equation of X_1 on X_2 and X_3 .

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
MICROBIOLOGY

Microbial Biochemistry and Physiology

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) Write short notes on bonding properties of carbon.

OR

- 2) Write short notes on molecules.

UNIT 2

- 3) Define Zwitter ion. Write short notes on peptides and polypeptides.

OR

- 4) Write the structure of sucrose.

UNIT 3

- 5) Write short notes on membrane filtration.

OR

- 6) Explain phagocytosis.

UNIT 4

- 7) Give the total ATP yield of electron transport chain.

OR

- 8) Write briefly on the types of lactic acid fermentation.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Explain the characteristics of buffer solution with examples. Add a note on its applications.

OR

- 10) Give a detailed account of the properties of water.

UNIT 2

11) Explain in detail about Vitamin B complex groups.

OR

12) Explain the types and classification of fatty acids.

UNIT 3

13) Explain continuous culture using bactogen as an example.

OR

14) Explain in detail about major and minor nutrients.

UNIT 4

15) Explain the dark reaction with a suitable example.

OR

16) Explain oxidation and reduction reactions with suitable examples.

21MICE21

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.A/B.Com./B.B.A/B.C.A SECOND SEMESTER DEGREE EXAMINATION
MAY/JUNE 2023

Environmental and Sanitary Microbiology

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

1) Write briefly on beneficial type of algae found in soil.

OR

2) List the types of interactions among the soil microorganisms.

UNIT 2

3) Write a short note on sources of water.

OR

4) Write a short note on importance of pure drinking water.

UNIT 3

5) Write a short note on Shigellosis.

OR

6) Write a note on HIV.

UNIT 4

7) Write briefly on role of algae as food for other living organisms.

OR

8) Write a note on Mumps.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

9) Write in detail on the types of bacteria and viruses found in soil.

OR

10) Write in detail about the factors affecting microorganisms in air.

UNIT 2

11) Explain about the Ground and Stored water.

OR

12) List and explain the types of microorganisms in water.

UNIT 3

13) Describe any three air borne viral diseases.

OR

14) Define public health hygiene. Add a note on the goals and significance of public health hygiene.

UNIT 4

15) Explain the significance of fungi in health and disease.

OR

16) Explain about importance of yeasts and molds in industries.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
MATHEMATICS

Number Theory, Algebra, Calculus II

Duration:2 Hours

Max Marks:60

PART - A

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

- a. Find the sum of positive integers less than 100 and relatively prime to 100.
- b. Find the value of $\phi(100)$.
- c. When is a binary operation is said to be commutative? Give an example of a binary operation which is commutative. Also give an example of a binary operation which is not commutative.
- d. Prove that if G is a group and $a, b \in G$, then $(a \cdot b)^{-1} = b^{-1} \cdot a^{-1}$.
- e. Find the domain of definition of the function:
 (i) $z = f(x, y) = \frac{1}{\sqrt{1-x^2-y^2}}$ (ii) $z = f(x, y) = x^2 + xy + y^2$.
- f. If $u = \frac{x^2y^2}{x^2+y^2}$, show by Euler's theorem that $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2} = 2u$.
- g. Evaluate $\int_0^1 \int_1^{e^x} \frac{x}{y} dy dx$.
- h. Evaluate $\int_C (x^2 + xy)dx + (y^2 - xy)dy$, where C is the x -axis from the origin to the point $(2, 0)$.

PART - B

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

- a. Prove that the quadratic congruence $x^2 + 1 \equiv 0 \pmod{p}$ where p is an odd prime has a solution if and only if $p \equiv 1 \pmod{4}$.
- b. If p and q are distinct primes such that $a^p \equiv a \pmod{q}$ and $a^q \equiv a \pmod{p}$ then prove that $a^{pq} \equiv a \pmod{pq}$.
- c. Let $n > 1$ and $\gcd(a, n) = 1$. If $a_1, a_2, \dots, a_{\phi(n)}$ are positive integers less than n and relatively prime to n , then prove that $aa_1, aa_2, \dots, aa_{\phi(n)}$ are congruent modulo n to $a_1, a_2, \dots, a_{\phi(n)}$ in some order.

- d. Determine the rational number represented by the simple continued fraction $[-2; 2, 4, 6, 8]$.

PART - C

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

- Show that for any subset A of G , the normalizer $N(A)$ of A is a subgroup of G .
- Let G be a set with a binary operation which is associative. Assume that G has a right unit element and every element of G has a right inverse. Prove that G is a group.
- Let G be a group and $a \in G$. Prove that the set $H = \{a^n | n \in \mathbb{Z}\}$ is a subgroup containing a .
- Prove that any subgroup of an infinite cyclic group is also an infinite cyclic group.

PART - D

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

- If $u = \tan^{-1} \frac{xy}{\sqrt{1+x^2+y^2}}$, show that $\frac{\partial^2 u}{\partial x \partial y} = \frac{1}{(1+x^2+y^2)^{\frac{3}{2}}}$.
- If $u = \cos^{-1} \frac{x+y}{\sqrt{x}+\sqrt{y}}$, show by Euler's theorem that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + \frac{1}{2} \cot u = 0$.
- Find $\frac{dz}{dt}$ when $z = xy^2 + x^2y$, $x = at^2$, $y = 2at$. Verify by direct substitution.
- Determine the relative extrema of $f(x, y) = x^2 - 4xy + y^3 + 4y$ if there are any.

PART - E

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

- Find the volume of the solid in the first octant bounded by the cone $z = r$ and the cylinder $r = 3 \sin \theta$.
- Find the surface area of top half of the sphere $x^2 + y^2 + z^2 = a^2$.
- Find the volume of the solid in the first octant bounded below by the xy plane, above by the plane $z = y$ and laterally by the cylinder $y^2 = x$ and the plane $x = 1$.
- Evaluate $\int_C 4xy dx + (2x^2 - 3xy) dy$, if the curve C is the first quadrant arc of the circle $x^2 + y^2 = 1$ from $(1, 0)$ to $(0, 1)$.

MATHEMATICS

PAPER II : CONIC SECTIONS, SPECIAL FUNCTIONS, FOURIER SERIES,
DIFFERENTIAL EQUATIONS AND NUMBER THEORY

Duration : 3hrs

Max Marks : 120

NOTE : 1. Answer any **TEN** questions in Part A. Each question carries 3 marks.

2. Answer **FIVE** full questions from Part B choosing **ONE** full question
from each unit.

PART A**10x3=30**

1. a) Find the focus, directrix and the length of the latus rectum of the Parabola $y^2 = 7x$.
- b) Define an Ellipse.
- c) Determine the conic $17x^2 - 12xy + 8y^2 - 80 = 0$ using discriminant test.
- d) Prove that $\Gamma\left(\frac{1}{2}\right) = \sqrt{\pi}$.
- e) Evaluate $\int_0^{\frac{\pi}{2}} \cos^6 \theta d\theta$.
- f) Derive an expression for Fourier coefficient a_0 of the function $f(x)$ of period 2π .
- g) Check the exactness of $3x(xy - 2)dx + (x^3 + 2y)dy = 0$.
- h) Find the Orthogonal trajectories of $y^2 = 4ax$.
- i) Solve $y(x^3 - y)dx - x(x^3 + y)dy = 0$.
- j) Solve $p^2 - x^2y^2 = 0$.
- k) Solve the differential equation $y = px + p^3$.

l) For the quadratic equation $f = Ap^2 + Bp + C = 0$, show that the p – discriminant equation is $B^2 - 4AC = 0$.

m) Prove that the square of any integer is either of the form $3k$ or $3k + 1$.

n) If a/bc , with $\gcd(a, b) = 1$, then prove that a/c .

o) Find whether the equation $3x+6y=18$ has a solution or not.

UNIT - I

2.a) Derive an equation of the Hyperbola in the standard form. (9)

b) Given the equation $xy = 1$, find an equation of the graph with respect to the \bar{x} and \bar{y} axes after a rotation of axes through an angle of radian measure $\frac{1}{4}\pi$ (9)

3.a) Find the eccentricity, center, foci, and directrices of the given Ellipse and draw a sketch of the graph $4x^2 + 4y^2 + 20x - 32y + 89 = 0$ (9)

b) Derive the relation $x = \bar{x}\cos\alpha - \bar{y}\sin\alpha$, $y = \bar{x}\sin\alpha - \bar{y}\cos\alpha$ between the old co ordinates (x,y) and the new co-ordinates (\bar{x}, \bar{y}) for the rotation by an angle α of the co-ordinate axes. (9)

UNIT - II

4. a) i) Evaluate $\frac{\Gamma(3)\Gamma(\frac{3}{2})}{\Gamma(\frac{9}{2})}$ (6+3)

ii) Evaluate $\int_0^1 x^4(1-x)^3 dx$

b) Find the Fourier coefficients of the periodic function

$$f(t) = \begin{cases} 0 & -2 < t < -1 \\ k & -1 < t < 1 \\ 0 & 1 < t < 2 \end{cases} \quad \text{and } f(t+4) = f(t). \quad (9)$$

5.a) Show that $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)} \quad m, n > 0$ (9)

b) Find Fourier series of function $f(x) = x + \pi, \quad -\pi < x < \pi$

and $f(x + 2\pi) = f(x)$ (9)

UNIT – III

6.a) solve the equation $(1 + 3x \sin y)dx - x^2 \cos y dy = 0$ (6)

b) Find the orthogonal trajectories of the family of cardioids $r=a(1+\cos\theta)$ (6)

c) solve the equation $(2x + 3y - 1)dx + (2x + 3y + 2)dy = 0$ (6)

7.a) solve: $y(x + y)dx + (x + 2y - 1)dy = 0$ (6)

b) solve: $y(6y^2 - x - 1)dx + 2xdy = 0$ (6)

c) solve the equation, $(x + 2y - 4)dx - (2x + y - 5)dy = 0$ (6)

UNIT – IV

8.a) Find the p - discriminant equation of $3x^4p^2 - xp - y = 0$. (6)

b) Solve the differential equation $xp^2 - 3yp + 9x^2 = 0$, for $x > 0$. (6)

c) Solve $yy'' + (y')^2 + 1 = 0$. (6)

9. a) Solve the differential equation $xyp^2 + (x + y)p + 1 = 0$. (6)

b) Find the general solution and singular solution of $p^2 - xp + y = 0$. (6)

c) Solve the equation $xy'' - (y')^3 - y' = 0$. (6)

UNIT-V

10.a) Given integers a and b with $b > 0$, prove that there exist unique integers

q, r such that $a = qb + r$, $0 \leq r < b$. (9)

b) solve the linear Diophantine Equation $56x + 72y = 40$ (9)

11.a) Prove that $\gcd(a,b) \mid \text{lcm}(a,b) = ab$, where 'a' and 'b' are positive integers.

(9)

b) i) Find the g.c.d Of 56 and 72 and express it in the form $56x + 72y$.

ii) If $\gcd(a,b) = d$, then prove that $\gcd(a/d, b/d) = 1$. (6+3)

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
MATHEMATICS – II

Duration: 2 hours

Max Marks: 60

PART A

1. Answer any Eight questions: 8×3=24

- a) Define Binary operation on the set G.
- b) If G is a group and $a, b \in G$, show that $(ab)^{-1} = b^{-1}a^{-1}$.
- c) Give an example to show that the union of 2 subgroups may not be a subgroup.
- d) If G is a cyclic group, then prove that G is abelian.
- e) Find the domain of the function $z = f(x, y) = x^2 + y^2$.
- f) If $u = x^2 - y^2, x = 2r - 3s + 4, y = -r + 8s - 5$ then find $\frac{\partial u}{\partial r}$.
- g) Find $f_y(x, y)$ if $f(x, y) = e^{ax} \sin by$.
- h) If $z = f(x, y)$ and $x = \phi(t), y = \psi(t)$ then write the formula for $\frac{dz}{dt}$.
- i) Evaluate $\int_0^1 \int_0^1 \frac{1}{\sqrt{1-x^2} \sqrt{1-y^2}} dx dy$.
- j) Evaluate $\int_0^\pi \int_0^{a\theta} r^3 dr d\theta$.
- k) Find the area of the curve $r = a(1 + \cos\theta)$ by integration.
- l) Evaluate $\int_C (x^2 + xy)dx + (y^2 - xy)dy$; C: is the line $y = x$ from the origin to the point (2, 2).

PART – B

2. Answer any Two questions: 2×6=12

UNIT-I

- a) Define a binary operation on the set of non-zero real numbers by $a * b = \frac{1}{2}ab$. Check whether the following properties are satisfied:
 - i) Associativity
 - ii) Existence of unit element and inverse
- b) Let H and K be subgroups of group G. Then prove that HK is a subgroup of G if and only if HK=KH.
- c) Prove that an infinite cyclic group has exactly two generators.

P.T.O.

UNIT-II

3. Answer any Two questions:

2×6=12

- a) If $u = \sin^{-1}\left(\frac{x^2+y^2}{x+y}\right)$ then prove by Euler's theorem that $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} = 0$.
- b) Find $\frac{dw}{dt}$ as a function of t , both by using the chain rule and by expressing 'w' in terms of t and differentiating directly with respect to 't'. Also find $\frac{dw}{dt}$ at the given point: $w = x^2 + y^2$, $x = at^2$, $y = 2at$, $t = 1$.
- c) Determine the relative extrema of $f(x, y) = x^3 + y^2 - 6x^2 + y - 1$ if there are any.

UNIT-III

4. Answer any Two questions:

2×6=12

- a) Change the order of integration and evaluate $\int_1^2 \int_0^{3y} y \, dx \, dy$.
- b) Show by double integration that the area between parabolas $y^2 = 4ax$ and $x^2 = 4ay$ is $\frac{16a^2}{3}$.
- c) Evaluate $\int_C 4xy \, dx + (2x^2 - 3xy) \, dy$, if C is the line segment from $(-3, -2)$ to $(1, 0)$.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

MATHEMATICS
Business Mathematics II

Duration:2 Hours

Max Marks:60

PART - A

I. Answer any 8 questions . Each question carries 3 marks: (3×8= 24 Marks)

- a. Check whether 57463822 is divisible by 11.
- b. Find the required number:
 $4368 + 2158 - 596 - ? = 3421 + 1262$
- c. Arrange the fractions $\frac{5}{8}$, $\frac{7}{12}$, $\frac{13}{16}$, $\frac{16}{29}$, $\frac{3}{4}$ in ascending order of magnitude.
- d. Given that $1^2 + 2^2 + 3^2 + \dots + 10^2 = 385$, then find the value of $2^2 + 4^2 + 6^2 + \dots + 20^2$.
- e. The monthly incomes of five persons are Rs.1132, Rs.1140, Rs.1144, Rs.1136 and Rs.1148 respectively. What is their arithmetic mean?
- f. A is twice as good a workman as B and together they finish a piece of work in 18 days. In how many days will A alone finish the work?
- g. A can do a piece of work in 8 days and B can do the same piece of work in 12 days. A and B together complete the same piece of work and get Rs.200 as the combined wages. Find the share of B.
- h. A bus covers a distance of 2924km in 43 hours. What is the speed of the bus?
- i. A train travelling with constant speed crosses a 90 m long platform in 12 seconds and a 120m long platform in 15seconds. Find the length of the train and its speed.
- j. How many times in a day, the hands of a clock are straight?
- k. The simple interest on a certain sum is Rs.360 for two years at 6% per annum. Find the sum.
- l. Find the compound interest on Rs. 8000 at 15% per annum for two years four months compounded annually.

PART - B

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

- a. When a certain number is multiplied by 13, the product consists entirely of fives. Find the smallest such number.

- b. The average of four consecutive even numbers is 27. Find the largest of these numbers.
- c. The sum of the ages of a daughter and her mother is 56 years. After four years, the age of the mother will be three times that of the daughter. Find their age at present.
- d. Six persons went to a hotel for taking their meals. Five of them spent Rs.32 each on their meals while the sixth person spent Rs. 80 more than the average expenditure of all the six. What was the total money spent by all the persons?

PART - C

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

- a. If a clock strikes six times in 5 seconds, then find the number of strikes in 10 seconds.
- b. A man covered a distance of 180km in 4hours on a bike. How much distance will he cover on bicycle in 8 hours if he rides the bicycle at one-sixth the speed of the bike?
- c. If a man goes 18km downstream in 4 hours and returns against the stream in 12 hours, then find the speed of the stream in km/hr.
- d. 6th March, 2005 was Monday. What was the day of the week on 6th March, 2004?

PART - D

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

- a. A sum at simple interest at $13\frac{1}{2}\%$ per annum amounts to Rs.2502.50 after four years. Find the sum.
- b. If the difference between the simple and the compound interest on a certain sum of money for three years at 5% per annum is Rs.15.25. Find the sum.
- c. A man wishes to pay back his debt of Rs.5044 due after 6 years by 6 equal yearly installments. Find the amount of each installment, money being worth 10% per annum compound interest.
- d. Raju avails a loan of Rs. 200000 at an interest rate of 6% per annum to be paid back in 4 years.As per this flat rate method raju will pay the interest on the total loan amount of Rs.200000. Calculate EMI using flat interest method.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
ZOOLOGY

Biochemistry and Physiology

Duration: 2 Hours

Max Marks: 60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

1) Write short note on Zwitter ion.

OR

2) Write a note coenzymes and Metal ions.

UNIT 2

3) Define Glycolysis. Write salient features of Glycolysis.

OR

4) Write a short note on formation of Peptide bonds.

UNIT 3

5) Write a note on protein absorption.

OR

6) Give a comprehensive account of respiratory pigments in animals.

UNIT 4

7) Write a note on sodium potassium pump.

OR

8) Draw a neat labelled diagram of human kidney.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

9) Give a detailed account on Glycolipids and Phospholipids.

OR

10) Derive Michaelis Menton equation and explain the Terms V_m and K_{max} .

UNIT 2

11) Define HMP shunt. Explain the reactions of HMP shunt.

OR

12) Explain Beta oxidation.

UNIT 3

13) With a neat labeled diagram describe the internal structure of human heart.

OR

14) Define Rh factor. Explain the significance of Rh factor.

UNIT 4

15) Give an account of chemical events that take place during muscle contraction.

OR

16) Explain the hormones of neurohypophysis.

21ZOOE21

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

BA/B.Com./BBA/BCA SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

Parasitology

Duration: 2 Hours

Max Marks: 60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) What is Schistosomiasis? Add a note its control measures.

OR

- 2) Give a brief account of Ectoparasites.

UNIT 2

- 3) Draw a neat labelled diagram of *Ancylostoma duodenale*.

OR

- 4) Explain gall formation.

UNIT 3

- 5) Discuss the public health importance of fleas.

OR

- 6) Write a note on characteristics of parasitoid insects.

UNIT 4

- 7) Write a note on immunodiagnosis methods.

OR

- 8) Write a note on significance of DNA and RNA probes in immunoassay.

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Explain the life cycle of *Hymenolepis nana*.

OR

- 10) What are parasites? Explain the types and classes of parasites.

UNIT 2

- 11) Draw a neat labelled diagram of *Trypanosoma gambiense*. Add a note on its control measures.

OR

- 12) Draw a neat labelled diagram of *Entamoeba histolytica*. Add a note on its control measures.

UNIT 3

- 13) Explain any four types of ticks.

OR

- 14) Give a detailed account of parasitic behavior of Cooki Cutter Shark. Add a note on its effect on host.

UNIT 4

- 15) Explain various methods of demonstration of parasites using molecular biological methods. Add a note on its limitations.

OR

- 16) What is haematophagy? Explain the nutritional adapataions shown by Vampire bats.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

BOTANY

Diversity of Non-flowering Plants

Duration: 2 Hours

Max Marks: 60

I. Answer any Five of the following :

(5×2= 10 Marks)

1. Draw a neat labelled diagram of *Scytonema*.
2. Mention any two uses of diatoms.
3. Write any two ecological importance of bryophytes.
4. What is a sporocarp?
5. Write any two angiospermic features of *Gnetum*.
6. Mention any two economic importance of gymnosperms.
7. What is cast?
8. Mention any four methods used to study fossils.

II. Answer any FOUR of the following :

(4×5= 20 Marks)

9. Write a note on beneficial aspects of algae.
10. Draw a neat labelled diagram of T.S. of *Sargassum* leaf.
11. Explain the structure of sporophyte of *Anthoceros*.
12. Explain the internal structure of leaf in *Funaria*.
13. Explain i) Ligule ii) Wall layers of sporocarp
14. Explain in brief the affinities of pteridophytes with higher plants.
15. What is radioactive dating? Write a note on it.
16. Write a note on any two methods used to study fossils.

III. Answer any THREE of the following :

(3×10= 30 Marks)

17. Explain (i) Diplobiontic life cycle (ii) Diplontic life cycle.
18. Explain the anatomy of *Equisetum* aerial shoot.
19. Write a detailed note on heterospory.
20. Explain the morphological characteristics of *Cycas*.

21PHYC201

Reg No :

**CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023**

PHYSICS

Electricity and Magnetism

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) Is there any electric field present inside a conductor? Explain.
b) What is a parallel plate capacitor? Derive an expression for capacity of a parallel plate capacitor when completely filled with dielectric material. (2+7)
2. a) Define capacitive time constant.
b) With relevant diagram discuss the oscillatory discharge of a LCR circuit. (2+7)

UNIT II

3. a) How do you estimate the potential due to a group of point charges?
b) Explain the potential associated with spherical charge distribution. (2+7)
4. a) Write a note on Hall effect.
b) State and explain the laws of electromagnetic induction. (2+7)

UNIT III

5. a) Obtain the phase relation between current and voltage in an ac circuit containing pure capacitance.
b) Draw the parallel LCR circuit and obtain the expression for the resonant frequency in a parallel LCR circuit. (2+7)
6. a) Obtain a relationship between quality factor and bandwidth in a series LCR circuit.
b) What is a low pass filter? Explain how a CR circuit can be used as a low pass filter and obtain the expression for cut-off frequency. (2+7)

UNIT IV

7. a) Under what conditions the vector field is solenoidal and irrotational?
b) Derive the wave equation for the field vectors E and B. Hence arrive at the equation for the velocity of electro-magnetic waves in a medium. (2+7)

8. a) Write down Maxwell's field equations. What are the terms associated with them?
b) Prove the law of energy of electromagnetic wave using Poynting theorem. (2+7)

PART - B

Answer any three questions:

3×5= 15

9. A parallel plate capacitor consists of two plates each of area $5 \times 10^{-4} \text{m}^2$. They are separated by a distance $1.5 \times 10^{-3} \text{m}$ and filled with dielectric of relative permittivity 5. Calculate the charge on the capacitor if it is connected to a 150V dc supply.
10. a) Consider a point charge $q = 1.5 \times 10^{-6} \text{C}$. What is the radius of the equipotential surface having potential 30V?
b) Find the potential due a point charge $q=2 \times 10^{-6} \text{C}$ at a distance of 200m.
11. Design a RC low pass filter for cut off frequency of 1.5 kHz using a capacitor of $0.1 \mu\text{F}$. Also calculate the cut off frequency for a high pass filter consisting of an $0.2 \mu\text{F}$ capacitor connected in series with a 796Ω resistor.
12. *Show that $\phi = x^2 - 2y^2 + z^2$ and $F = x^2 + y^2 - 2z^2$ satisfy Laplacian equation.*

21PHYE21

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

BA./B.Com./BBA/BCA SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

PHYSICS

Energy Sources

Duration:2 Hours

Max Marks:60

PART A

Answer any 5 questions. Each question Carries 3 marks:

5×3= 15

1. What are fossil fuels? Give the types of fossil fuels.
2. State any three advantages of a Solar still.
3. Define wind energy.
4. Mention any 3 advantages of Ocean energy.
5. What is a bio gas plant?
6. Write a short note on bio mass.

Answer any 5 questions. Each question Carries 9 marks:

5×9= 45

7. With a relevant diagram explain the functioning of a Solar greenhouse.
8. With a relevant diagram explain the working of a Solar cell.
9. Explain the principle of a Solar Pond. State the advantages and disadvantages of the same.
10. How does OTEC works? Explain.
11. Mention the challenges of wind energy.
12. Mention the advantages of hydroelectric power.

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
BA/B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
CHEMISTRY

Health and Nutrition for the Family

Duration:2 Hours

Max Marks:60

SECTION - A

Answer the following strictly observing the internal choice provided:

4×5=20

UNIT 1

- 1) Define health and explain any two components.

OR

- 2) Elaborate on dietary guidelines for various physiological conditions.

UNIT 2

- 3) What is a food pyramid? Explain.

OR

- 4) Elaborate on any 5 factors that affect menu planning.

UNIT 3

- 5) Explain the nutritional concerns during old age.

OR

- 6) Explain the dietary guidelines for lactating woman with examples.

UNIT 4

- 7) What are the dietary guidelines for Adolescents?

OR

- 8) How can poor nutrition affect preschoolers?

SECTION - B

Answer the following strictly observing the internal choice provided:

4×10=40

UNIT 1

- 9) Elaborate on any 5 lifestyle diseases with risk factors and diagnosis.

OR

- 10) Explain the factors that influence health.

UNIT 2

- 11) a) Elaborate the classification of food.
- b) Explain menu planning with steps.

OR

- 12) a) Explain the importance of Balanced diet.
- b) Enumerate the food related behaviours.

UNIT 3

- 13) Explain healthy food choices and dietary guidelines during pregnancy.

OR

- 14) Explain the nutritional requirement of adult with RDA.

UNIT 4

- 15) a) What is breast milk? Explain the various stages of breast milk production.
- b) Explain weaning foods for infants.

OR

- 16) Write the importance of breakfast and packed lunch box.

21CHEC201

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

CHEMISTRY

Inorganic and Physical Chemistry - I

Duration:2 Hours

Max Marks:60

PART - A

I. Answer any SIX from the following:

(2×6= 12 Marks)

1. Write the electronic configuration of Fe (At No.26).
2. Name the different types of d orbitals.
3. Give reason: Carbon of group14 forms polynuclear hydrides.
4. Write the structures of Sulphur dioxide and Nitric oxide.
5. Define RMS velocity. Give its expression.
6. What is Boyle temperature? Give its expression.
7. What are cholesteric liquid crystals?
8. Define Miller indices.

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. Explain Bohr's theory for hydrogen atom. What are its limitations?
b. Derive de Broglie equation and give its significance. (4+4)
- 10 a. Describe Slater's rules for determining effective nuclear charge.
b. Calculate Z_{eff} for valence electrons in Ca and Br. (4+4)

UNIT II

11. a. What are the applications of electronegativity?
b. Write a note on interhalogens. (4+4)
- 12 a. What are the factors affecting ionisation energy?
b. Write a note on covalent carbides. (4+4)

UNIT III

13. a. Derive expressions for critical constants in terms of Van der Waals constants a and b .
b. If $T_c = 33.3\text{K}$, $P_c = 12.97\text{ atm}$, $V_c = 6.5 \times 10^{-5}\text{m}^3\text{mol}^{-1}$ for hydrogen. Calculate van der Waal's parameters. (5+3)
- 14 a. Write the Van der Waal's equation. How does it explain the behaviour of real gases.?
b. What is Parachor? Calculate the parachor values of benzene given the density of benzene at 20°C is 0.878g/cc and surface tension is 29.3 dynes/cm and the parachor values of H, C, doublebond and ring is 17.1, 4.8, 23.2 and 6.1 respectively. (4+4)

UNIT IV

15. a. How is distribution law modified when the solute molecule undergoes association in one of the solvents?
b. How is crystal structure determined using single crystal method? (4+4)
- 16 a. Derive Bragg's equation.
b. Give the limitations of Nernst Distribution law. (5+3)

18CHE201

Reg No :

CHOICE BASED CREDIT SYSTEM

B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

CHEMISTRY

Chemistry Theory II

Duration:3 Hours

Max Marks:80

I. Answer any SEVEN of the following :

(7×2= 14 Marks)

1. What are " Wrap around complexes"? Give an example.
2. Which is the most electropositive among the alkaline earth metals and why?
3. What is the role of gypsum in the setting of cement?
4. Give any two factors affecting the rate of a reaction.
5. The equilibrium constant for a reaction is found to be 5.63 at 298K. Calculate standard free energy change for the reaction.($R = 8.314 \text{ JK}^{-1}\text{mol}^{-1}$)
6. How is ethylene chlorohydrin converted into ethylene glycol?
7. Presence of chlorine in benzene ring is ortho-para directing for electrophilic substitution reaction. Give reason
8. Picric acid is a stronger acid than phenol. Give reason.

II. Answer any SIX of the following :

(6×6= 36 Marks)

9. a. Why does beryllium not impart characteristic colour to the flame? (3)
b. Lithium is a good reducing agent. Give reason. (3)
10. a. Explain the diagonal relationship between lithium and magnesium. (4)
b. Explain two functions of sodium in biological system. (2)
11. a. How is chlorine manufactured by membrane process? (3)
b. Write three applications of sodium hydroxide. (3)
12. a. Write a note on choice of catalysts for designing a green synthesis. (3)
b. Write any three principles of green chemistry. (3)
13. a. Explain atom economy with an example. (3)
b. Explain the conventional and green method of synthesis of benzoic acid from toluene. (3)

14. a. Explain the mechanism for hydrolysis of methyl bromide. (3)
 b. Explain the mechanism for the reaction between ethyl bromide with ethoxide ion. (3)
15. a. Explain phthalein fusion reaction. (3)
 b. Write the structure of vanillin and mention two of its applications. (3)

III. Answer any THREE of the following :

(3×10= 30 Marks)

12. a. Explain the process of manufacture of paint. (5)
 b. How is white lead manufactured by Dutch Process? (5)
13. a. Derive Clausius-Clapeyron equation. (5)
 b. Water boils at 100°C at one atmospheric pressure. At what temperature will it boil when atmospheric pressure becomes 528 mm of Hg at some space station. Latent heat of water is 2.28 kJ/g. ($R = 8.314 \text{ J K}^{-1} \text{ mol}^{-1}$). (5)
14. a. Explain with two examples how chemical kinetics is used in the determination of reaction mechanism. (5)
 b. Hydrolysis of ethyl acetate by NaOH using equal concentration of reactants was studied by titrating 5 cm³ of the reaction mixture at different time intervals against standard HCl. From the data given below show that this is a second order reaction. (5)

Time (mins)	0	4.89	10.07	23.66
volume of acid used(ml)	47.65	38.92	32.62	22.58

15. a. What is peroxide effect? Explain the mechanism of addition of hydrogen bromide to propene in the presence of peroxide. (5)
 b. What is Markovnikov's rule ? Discuss the mechanism of addition of HCl to propene. (5)

21CHEE21

Reg No :

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME

BA/B.Com./BBA/BCA SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023

CHEMISTRY

Molecules of Life

Duration:2 Hours

Max Marks:60

PART A

I. Answer any FIVE of the following

5×2= 10

- 1 Define peptide linkage.
- 2 What is renaturation of proteins?
- 3 Give two biological importances of steroids.
- 4 Give two biological importances of phospholipids.
- 5 Why is ATP called as "Energy Currency of the Cell"
- 6 Write the difference between catabolism and anabolism.

PART B

II. Answer any FIVE of the following choosing at least one question from each Unit. 5×10= 50

UNIT I

- 7 a. Explain mutarotation.
b. Write the difference between anomers and epimers.
c. Explain the classification of amino acid based on functional group. (4+3+3)
- 8 a. With an example explain electrophoresis.
b. Explain the classification of carbohydrates.
c. Explain the isoelectric point of amino acids. (4+3+3)

UNIT II

- 9 a. Write the Haworth structure of glucose and fructose.
b. Write the classification of proteins based on the structure.
c. Write a note on conversion of food into energy. (4+3+3)
- 10 a. Explain the classification of lipids.
b. Write a note on the biological importance of phospholipids and steroids.. (5+5)

UNIT III

- 11 a. Explain the following factors affecting the enzyme action:
i) temperature ii) enzyme concentration
b. Write any five biological importances of triglycerides. (5+5)
- 12 a. Write a note on receptor theories.
b. Write a note on importance of enzyme inhibitors. (5+5)

CHOICE BASED CREDIT SYSTEM SEMESTER SCHEME
B.Sc. SECOND SEMESTER DEGREE EXAMINATION MAY/JUNE 2023
COMPUTER SCIENCE

Computer Science Theory II: Data Structures using C

Duration:2 Hours

Max Marks:60

PART A

Answer any FIVE questions:

(5×2= 10)

- 1) What is non-linear data structure? Give example.
- 2) State any two advantages of using a Doubly Linked List.
- 3) Define stack as a data structure.
- 4) What is Ascending Order Priority Queue? Give example.
- 5) State the demerit of linear representation of binary trees.
- 6) What is the difference between a directed graph and an undirected graph?

PART B

Answer any FIVE questions :

(5×6= 30)

- 7) How do you initialize one-dimensional array? Explain with syntax and example.
- 8) Explain binary search technique with an example.
- 9) Write the algorithm for selection sort.
- 10) What is a Circular Queue? Briefly explain with an example.
- 11) What is a Binary Tree? Explain Strict Binary Tree with an example.
- 12) Write a program to implement queue using arrays.

PART C

Answer any TWO questions :

(2×10= 20)

- 13) (a) What is a Singly Linked List? Explain its working with an example.
(b) Explain getnode and freenode operations of a linked list.
- 14) (a) Write an algorithm to convert an infix to postfix expression.
(b) Evaluate the postfix expression: 2 3 1 * + 9 -
- 15) With an example explain construction and traversal of binary trees.
